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FOOD TECHNOLOGY ABSTRACTS

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Our Communication Channels:

Phone : 0821-515850
Fax : 0821-516308 / 517233
E-mail : fostis@cscftri.ren.nic.in
fostis@nicfos.ernet.in

Contact Address:

H. Y. Mahakuteshwar
Head
FOSTIS, CFTRI,
Mysore – 570 013, India.

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National Information Centre For Food Science And Technology
Central Food Technological Research Institute,
Mysore - 570 013, India

Compiled & Edited by

B. Vasu

C. S. Anita

Abstractors to FTA

AA	Author's Abstract
BV	B. Vasu
CRG	C. R. Goud
CSA	C. S. Anita
GS	Geetha Seetharam
SD	S. Dhanaraj
SRA	S. R. Ananthnarayan

Computerisation and Database Creation

P. Manilal

C. S. Anita

B. Vasu

Production

S. Umesh

P. S. Ganesh Prasad

C. N. Janardhan

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FOOD
TECHNOLOGY
ABSTRACTS

Vol. 34, No. 5, 1999

CONTENTS

	Page No
General	... -
Food Processing	... 265
Food Packaging	... -
Food Engineering and Equipment	... 265
Energy in Food Processing	... -
Food Chemistry and Analysis	... 266
Food Microbiology and Hygiene	... 267
Biotechnology	... -
Tissue Culture	... -
Food Additives	... 271
Cereals	... 272
Millets	... 276
Pulses	... 277
Oilseeds and Nuts	... 279
Tubers and Vegetables	... 280
Fruits	... 284
Confectionery, Starch and Sugar	... 288
Bakery products	... 289
Milk and Dairy products	... 291
Meat and Poultry	... 296
Seafoods	... 299
Protein Foods	... -
Alcoholic and Non-alcoholic Beverages	... 302
Fats and oils	... 305
Spices and Condiments	... 306
Sensory Evaluation	... 307
Food Storage	... -
Infestation Control and Pesticides	... 307
Biochemistry and Nutrition	... 307
Toxicology	... -
Food Laws and Regulations	... -
Author Index	... 309
Subject Index	... 317

ABBREVATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon..	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2,cm^3]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylene diamine tetraacetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 1]
hp	horse power
HPLC	high performance/ pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-	equivmilli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	Poise
p	probability
Pa	pascal (N/M^2)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	poly tetra fluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
resp.	respectively
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sol.	solution
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatograpny
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro-[as in g, µm]
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

ABBREVIATIONS FORLANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	E
Swedish	Sv

FOOD PROCESSING

810

Stoforos (NG) and Taoukis (PS). **A theoretical procedure for using multiple response time-temperature integrators for the design and evaluation of thermal processes.** *Food Control* 9(5); 1998; 279-287

The proposed procedure in using multiple response time-temp. integrators (TTI) systems to evaluate the impact of a thermal process on a particular target heat labile substance, produced satisfactory results and can serve as an alternative for the cases where a single-component TTI with a particular z value in not available. Important parameters to be considered in using a multi-component TTI, for each particular case, include the z values of the TTI, in relation to the target z value, as well as the reference temp. used for the calculations. Generally, triple response TTIs performed better compared with double response TTIs, the results of double response TTI s were also satisfactory, and for practical applications, the use of a double response TTI might be sufficient. SRA

811

Barsotti (L) and Cheftel (JC). **Food processing by pulsed electric fields: II. Biological aspects.** *Food Reviews International* 15(2); 1999; 181-213

Review covers, effects of pulsed electric fields (PEF) on biological membranes, effects of PEF on microorganisms (influence of intrinsic microbial characteristics, influence of medium or food characteristics, influence of process parameters, morphological modifications of microorganisms), extraction of juices and metabolites by electroporation, PEF, chemical modifications, and food quality (effects of PEF on enzymes, effects PEF on sensorial characteristics of foods), potential food applications. Many references. SRA

812

Barsotti (L), Merle (P) and Cheftel (JC). **Food processing by pulsed electric fields: I. Physical aspects.** *Food Reviews International* 15(2); 1999; 163-180

This review deals with food processing by high field, very short time electrical pulses. Pulsed electric field systems (principles, components, and circuits) characteristics of electric pulses; main operating parameters of a pulsed electric field process; electrical characteristics of foods, food behaviour in a pulsed electric field (dielectric breakdown). 14 references. SRA

813

Ibrrola (JJ), Guillen (JC), Sandoval (JM) and Garcia-Sanz (M). **Modelling of a high temperature short time pasteurization process.** *Food Control* 9(5); 1998; 267-277

This paper presents a new mathematical model for the behaviour of a HTST pasteurization plant. Each physical part of the plant was identified separately and the complete process was considered as a union of the single parts. This model was able to work with different operating points, within the hardware limits. It incorporated the non-linearities of the process (from varying flow) through parameter variation. The model obtained was based on real data from an existing pasteurization process. The validation results showed that this model was suitable for control purposes, allowing it to operate at variable flow rates. AA

FOOD PACKAGING

Nil

FOOD ENGINEERING AND EQUIPMENT

814

Miyawaki (O), Liu (L) and Nakamura (K). **Effective partition constant of solute between ice and liquid phases in progressive freeze-concentration.** *Journal of Food Science* 63(5); 1998; 756-758

Progressive freeze-concn. was effectively applied to conc. glucose in a model sol. Effective partition constants of the solute between the liquid and solid phases were determined experimentally. The constant was strongly dependent on the stirring rate at the ice front and the advance rate of the ice front. Increasing stirring rate and reduced rate of advance lowered the effective partition constant: an improvement in freeze concn. performance. A concn. polarization model was useful to describe the

effects of the operating conditions on the effective partition constant. AA

Equipments

815
Smout (C), van Loey (A) and Hendrickx (M). **Heat distribution in industrial-scale water cascading (rotary) retort.** *Journal of Food Science* 63(5); 1998; 882-886

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

816
Marcone (MF), Kakuda (Y) and Yada (RY). **Salt-soluble seed globulins of various dicotyledonous and monocotyledonous plants: I. Isolation/purification and characterization.** *Food Chemistry* 62(1); 1998; 27-47

817
Adams (JB) and Langley (FM). **Nitrophenyl glucoside hydrolysis as a potential time-temperature integrator reaction.** *Food Chemistry* 62(1); 1998; 65-68

Hydrolysis of p-nitrophenyl β-D-glucopyranoside (NPG) in borate buffer, pH 11.0, has been investigated as a potential chemical time-temp. integrator (TTI) reaction. The yellow nitrophenolate ion produced on hydrolysis was shown to be highly stable and to follow first order kinetics of formation. The temp.-coeff. of the reaction rate (z-value) was found to be 21.7 (plus or minus 1.2)°C over the range 91.0-121.1°C. Glucose formed on hydrolysis was unstable, apparently undergoing caramelisation to brown pigments. The latter compounds were shown not to interfere with the measurement of nitrophenolate absorbance. It was concluded that NPG hydrolysis was a reaction with significant potential for application as a chemical TTI. AA

818
Chauhan (GS), Eskin (NAM) and Mills (PA). **Effect of saponin extraction on the nutritional quality of quinoa (*Chenopodium quinoa* Willd.) proteins.** *Journal of Food Science and Technology (India)* 36(2); 1999; 123-126

The effects of saponin extraction and protein isolation on the nutritional quality of proteins of quinoa were evaluated. The contents of amino acids except for lysine, valine and isoleucine in protein preparation after the extraction of saponins. Quinoa proteins showed a balanced content of all the essential amino acids when compared with FAO/WHO/UNU reference pattern of amino acids. The extraction of saponin increased the protein efficiency ratio (PER) of quinoa proteins and did not affect the biological value (BV). Removal of saponins exhibited different effects on *in vitro* protein digestibility of quinoa proteins with different enzymes during the course of hydrolysis. AA

819
Bell (LN), White (KL) and Chen (Y-H). **Maillard reaction in glassy low-moisture solids as affected by buffer type and concentration.** *Journal of Food Science* 63(5); 1998; 785-788

Glucose loss and brown pigment formation were evaluated in low-moisture glassy systems obtained by lyophilizing sol. containing various concn. of phosphate or citrate buffer at pH 7 and 25°C. Rate constants (RC) for glucose loss decreased as buffer concn. increased, suggesting that a change in the system pH had occurred. RCs for browning increased with increasing phosphate buffer (PB) concn. and decreased with increasing citrate concn. PB appeared to catalyze later pathways of the Maillard reaction. SRA

820
Muller (M), Anke (M) and Illing-Gunther (H). **Aluminium in foodstuffs.** *Food Chemistry* 61(4); 1998; 419-428

The Al content (AC) of a comprehensive food assortment typical of German nutritional habits was determined within the framework of market basket studies. Carried out in 1988 and 1991, a total of 128 items out of 12 groups of foodstuffs were included in this investigation. AC of the food assortment was low and comparable with literature data. Most investigated foodstuffs contained < 5 µg Alg^{-1} FM.

Highest concn. were determined in cocoa/cocoa products (33 μg g^{-1}), spices (145 μg g^{-1}) and black tea leaves (899 μg g^{-1}). In general, AC of frequently consumed food, increased in the following order: beverages, food of animal origin, food of plant origin. With this low level of Al concn. in food, there is no danger of Al exposure in healthy persons. AA

821

Chitpintyol (S) and Crabbe (MJC). **Chymosin and aspartic proteinases.** *Food Chemistry* 61(4); 1998; 395-418

Reviews chymosin and other aspartic proteinases (natural sources), physical properties and stability (mol. wt. and isoelectric points, enzyme stability, enzyme solubility), structure of chymosin and other aspartic proteinases (gene sequence and primary structure, secondary structure, tertiary structure) the active site, catalytic mechanisms, zymogen activation, substrate-binding pockets and specificity, inhibitors, mechanism of milk clotting and recombinant calf chymosin. Many references. BV

Chemistry (Analytical)

822

Sarker (DK), Bertrand (D), Chtioui (Y) and Popineau (Y). **Characterization of foam properties using image analysis.** *Journal of Texture Studies* 29(1); 1998; 15-42

The physical properties of a series of model protein, surfactant and protein/surfactant foams were enumerated and investigated using foam conductivity, surface tension, preliminary surface rheology and bulk viscosity measurements. Images of various predetermined stages in the evolution of foam samples were obtained. Foam images were recorded, digitised and analysed using mathematical analysis of image texture. A textural appreciation was achieved by counting bubbles in selected images at key points during the evolution of the foam. Statistical treatment allowed delineation of real and mathematical artefacts generated in textural descriptions of foams. A principal component analysis parameter was identified, which not only corresponded with bubble size but also described bubble shape and occurrence in the texture. Analysis of the data showed correlations between sample images and changes in the structure and the composition of the adsorbed interfacial layer, highlighted using physical measurements. AA

823

Cataldi (TRI), Margiotta (G) and Zambonin (CG). **Determination of sugars and alditols in food samples by HPAEC with integrated pulsed amperometric detection using alkaline eluents containing barium or strontium ions.** *Food Chemistry* 62(1); 1998; 109-115

FOOD MICROBIOLOGY AND HYGIENE

Fermentation

824

Manzocco (L), Maltini (E) and Lerici (CR). **Changes of some thermal and physical properties in model systems simulating an alcoholic fermentation.** *Journal of Food Processing Preservation* 22(1); 1998; 1-12

Highly simplified model systems, simulating the fermentation of 25.00% sugar-water mixture into a 12.78% ethanol-water mixture, were considered in order to study their thermo-physical properties. Calorimetric data, viscosity and a_w detn. showed that important thermal and physical changes are associated with the steps of a fermentation process. Besides the increase in ethanol content, other concomitant changes are a strong increase in ethanol vapour pressure and a decrease in a_w and viscosity. DSC measurements of the models during scanning from -140°C to 25°C showed three peaks: peak 1 (exotherm) covered a temp. range from -110°C to -80°C and was attributed to the recrystallization of the ethanol monohydrate; peak 2 (endotherm), with peak temp. around -70°C, was attributed to the melting of the alcoholic monohydrate; peak 3 (endotherm) in the higher temp. range from -30°C to 0°C, was due to ice melting. The alcoholic monohydrate appeared only in the final simulated step of the fermentation, where only ethanol and water were present. The inhibitory effect of even small amounts of sugars on the formation of the monohydrate might be related to the increase in viscosity. This would confirm the formation of the ethanol hydrate as kinetically hindered, as it is reported in the literature. AA

Microorganisms

Bacteria

825
Bowles (BL) and Juneja (VK). **Inhibition of foodborne bacterial pathogens by naturally occurring food additives.** *Journal of Food Safety* 18(2); 1998; 101-112

In this study, diacetyl (DI), benzaldehyde (BE), pyruvic aldehyde (PY) and piperonal (PI) were tested for activity against *Yersinia enterocolitica*, *Listeria monocytogenes*, *Salmonella typhimurium*, *Bacillus cereus*, *Shigella flexneri*, *Aeromonas hydrophila*, *Escherichia coli* O157:H7, *Staphylococcus aureus*, and proteolytic *Clostridium botulinum* spores. The minimal inhibitory concn. (MICs) required to inhibit pathogens ranged from 0.05 to 7.81 mM. The only exception was *C. botulinum* which was less sensitive, with DI or PY MIC of 25 mM; the MIC of BE or PI was 125 mM. A 30 min 56.8°C heat treatment, of the organism/inhibitor mixture, reduced the MICs of BE and PI by 50-87%, and 77% less PY was required to inhibit *E. coli* O157:H7. BE or PI reduced *C. botulinum* spore 80°C thermal- and radio-resistance. To determine whether antibacterial plant components exist naturally at inhibitory concn., EtOH-extracts of asparagus, carrots, radishes, shallots, and turnips were tested for antibotulinal activity. Asparagus or carrot extracts were antigerminative at 0.07%. When combined equal quantities of asparagus and carrots were tested, less than or equal to 0.03% delayed germination, however. Although no activity was observed when radish and shallots were test alone, 0.13% asparagus carrot raddish, asparagus carrot radish shallots or asparagus carrot radish shallots turnip combinations were inhibitory. These data indicate that the naturally occurring food additives may be employed to control the foodborne pathogens assessed in this study. AA

826
Doherty (AM), McMahon (CMM), Sheridan (JJ), Blair (IS), McDowell (DA), Hegarty (T). **Thermal resistance of *Yersinia enterocolitica* and *Listeria monocytogenes* in meat and potato substrates.** *Journal of Food Safety* 18(2); 1998; 69-83

Aeromonas hydrophila

827
McMahon (MAS), Blair (IS) and McDowell (DA). **Filamentation in *Aeromonas hydrophila*.** *Food Microbiology* 15(4); 1998; 441-448

Aerobic or 100% CO_2 cultures of *Aeromonas hydrophila* growing in Tryptone Soya Broth at 5, 10 or 28°C, were examined for filamentation and chain formation. Microscopy indicated that filamentation and chain formation occurred at all temp. in the presence of 100% CO_2. No such filamentation was noted in aerobically grown cells. Cultures exhibiting filamentation were not proteolytically or haemolytically active. Reversion to normal morphology and enzymatic activity occurred within 24 h of subsequent aerobic incubation. The reasons for and adaptive value and pathogenic implications of this response are discussed. AA

Bacillus cereus

828
Gaillard (S), Leguerinel (I) and Mafart (P). **Model for combined effects of temperature, pH and water activity on thermal inactivation of *Bacillus cereus* spores.** *Journal of Food Science* 63(5); 1998; 887-889

Initially, the effect of a_w on heat resistance of *Bacillus cereus* spores (decimal reduction time) was investigated. A linear relationship was found between log D and 1-a_w. The combined effects of temp. (85-105°C), pH (4.5-6.5) and a_w (0.80-1) were then studied. A four parameter model was fitted to the data. This model appeared to be parsimonious with each parameter having a biological significance. Interactions between factors were observed but they accounted for < 2.4% of the total variation and they were not taken into account by the model. AA

Bacillus subtilis

829
Geeraerd (AH), Herremans (CH), Ludikhuyze (LR), Hendrickx (ME) and Impe (JFV). **Modelling the kinetics of isobaric-isothermal inactivation of *Bacillus subtilis* α-amylase with artificial neural networks.** *Journal of Food Engineering* 36(3); 1998; 263-279

During the isobaric-isothermal inactivation of the enzyme α-amylase a simple first order inactivation kinetic is observed. However, the temp. and pressure dependence of the inactivation rate constant k (min^{-1}) is more complex. A non-synergetic (cumulative) model inspired by the Arrhenius law is proposed as a non-linear description. Significant model deficiency is observed at non-intermediate values of pressure and temp. Due to the lack of sufficient knowledge of the underlying biological and physical mechanisms, in this paper a black box modelling approach is made using artificial neural networks. The resulting artificial neural network structure is able to predict the combined effect of pressure and temp. on the inactivation rate constant k (min^{-1}) of α-amylase without significant increase of the model complexity as compared to the Arrhenius type model. The accuracy of the ANN model parameters is evaluated using the concept of joint confidence regions. AA

Clostridium botulinum

830

Whiting (RC) and Strobaugh (TP). **Expansion of the time-to-turbidity model for proteolytic *Clostridium botulinum* to include spore numbers.** *Food Microbiology* 15(4); 1998; 449-453

A model was previously developed to predict the time-to-turbidity of proteolytic *Clostridium botulinum* spores placed in broths having various pH values. NaCl concn. and temp. (Whiting and Call 1993); however, the model had a constant number of spores (10^4). This fixed number of spores limits the use of the model and makes inferences to foods more difficult. New data were collected and fitted to the logistic model. Regression equations were calculated to provide parameter estimates for different combinations of temp., pH, NaCl concn. and spore number. The predicted mean times-to-turbidity increased with decreasing numbers of spores; at 20°C-pH 7.0-1.0% NaCl, for example, the mean time-to-turbidity was 4.3 and 7.1 days for 10^4 and 10^0 spores per sample, resp. AA

Escherichia coli

831

Tu (S-I), Patterson (D) and Uknalis (J). **Adenosine triphosphate enhances the fluorescence of 4',6-diamidino-2-phenylindole (DAPI)-labeled *Escherichia coli* O157:H7.** *Journal of Food Safety* 18(2); 1998: 113-126

Live cells of *E. coli* O157:H7 were labelled by 4',6-diamidino-2-phenylindole (DAPI) in buffers of different pH. The extent of labelling was relatively insensitive to pH in the range of 6.5 to 9.5. The fluorescence intensity of ~10^4 DAPI-labelled bacteria per mL in optical cuvettes could be detected by a luminescence spectrometer. With a fluorescence microplate reader attachment, less than 10^3 of labelled bacteria could be measured. DAPI-labelling inhibited the growth and respiratory activities of the bacteria. The addition of 0.5 to 6 mM concn. of ATP induced a substantial increase in the fluorescence of labelled bacteria. Maximal enhancement by ATP was observed from bacteria still maintaining low levels of physiological activities. The enhancement favoured more alkaline media with pH greater than 9. A replacement of ATP with ADP or AMP diminished the extent of enhancement. Other triphosphate nucleotides did not enhance fluorescence of DAPI-labelled bacteria. Comparable ATP enhancements were also observed with *Pseudomonas alcaligenes* and *Shewanella putrefaciens*. Solubilization/destruction of cell membranes of labelled bacteria by detergents essentially eliminated the ATP enhancement. Absorption and fluorescence spectroscopic measurements indicated that ATP could interact with free and bound DAPI. These results suggest that observed ATP enhancement in fluorescence intensity of DAPI labels in intact cells may be applied to increase the sensitivity of microorganism detection. AA

Lactobacillus acidophilus

832

Gupta (PK) and Chauhan (RS). **Survival of hypocholesterolemic and antagonistic strains of *Lactobacillus acidophilus* in acidic pH, in presence of bile salt and their adherence to vero cells.** *Journal of Food Science and Technology (India)* 36(2); 1999; 152-154

The population of *Lactobacillus acidophilus* strain 301 (antagonistic) decreased in the presence of 0.3% bile salt throughout the period of study. In contrast, *L. acidophilus* strain 1899 (hypocholesterolemic) exhibited more or less similar pattern of growth to both in the presence (experimental) and absence (control) of bile salt. Both strains exhibited satisfactory growth at pH 4.

and 5.0. However, they attained lower number at pH 3.0. But at pH 2.0, only some cells of strain 1899 were able to survive for 2 h. It was interesting that the hypocholesterolemic strain 1899 was found to adhere to vero cells whereas, antagonistic strain 301 failed to adhere. AA

Listeria

833
Walsh (D), Duffy (G), Sheridan (JJ), Blair (IS) and McDowell (DA). **Comparison of selective and nonselective enrichment media for the isolation of *Listeria* species from retail foods.** *Journal of Food Safety* 18(2); 1998; 85-99

Fungi

Yeasts

834
Chen (H-L), Su (H-P) and Lin (S-W). **Characterization of yeast cultures for a flavouring agent in a yoghurt-type product.** *Journal of Food Science* 63(5); 1998; 897-900

To develop yoghurt-type dairy products, yeast cultures including *Candida magnoliae*, *Endomyces fibuligera*, *Saccharomyces bayanus*, *S. cerevisiae*, *S. diastaticus*, *S. formosensis*, and *Pichia anomala* were evaluated for combination with *Rhizopus javanicus*. Treatment with chiu-yao was used as the control. *R. javanicus* combined with each of the yeast cultures produced a large amount of culture filtrates exhibiting appropriate milk-clotting activity and gave a yoghurt-type product with a smooth surface and fine texture, which was not notably different ($P > 0.05$) from that of *R. javanicus* alone. Treatment with *R. javanicus* combined with *S. cerevisiae* produced the most ethanol and the least reducing sugars after 4 days fermentation. This treatment also exhibited components of aroma most similar to that of chiu-yao. AA

835
Iranzo (JFU), Perez (AIB) and Canas (PMI). **Study of the oenological characteristics and enzymatic activities of wine yeasts.** *Food Microbiology* 15(4); 1998; 399-406

Seventy-four wine strains of the *Saccharomyces* genus were tested to study their oenological characteristics and enzymatic activities. These strains were isolated from spontaneous microbiota taken from cellars in the Valdepenas region (Spain) and identified by contour homogeneous electric field (CHEF) technique. When Cluster Analysis was applied to oenological properties, only SH_2 production, tolerance to 12° of ethanol and synthesis of killer toxin contributed to the distribution of the strains in the different statistical groups. All the strains possessed esterase activity and some also showed protease and pectinase activities. None of them had β-D-glucosidase activity. AA

Schizosaccharomyces

836
Chaudhari (AB) and Chincholkar (SB). **New osmotolerant *Schizosaccharomyces* for ethanol production.** *Journal of Food Science and Technology (India)* 36(2); 1999; 166-169

A total of 30 new yeast strains obtained from alcohol mill waste screened for alcohol production. From this, 11 osmotolerant yeast strains were chosen for their capacity to ferment high graviy worts. These strains were identified as *Schizosaccharomyces pombe*. Yeast strains Y11 was studied for ethanol production at higher sugar concn. and higher temp. At 43°C, Y11 was able to ferment 15% total sugars in molasses to ethanol (51 g/L) while at 27°C, 25% total sugar in molasses was fermented to give to < 90.2 g/L of ethanol. AA

Hygiene

837
Panisello (PJ) and Quantic (PC). **Application of Food MicroModel predictive software in the development of hazard analysis critical control point (HACCP) system.** *Food Microbiology* 15(4); 1998; 425-439

A practical application of the Food MicroModel (FMM) predictive software is presented. A case study on meat-based pate is used to illustrate the various requirements needed to assure the safety of this type of foodstuff when pH is reduced. Identification of hazards was obtained from a literature review and confirmed by epidemiological links between the product and foodborne disease outbreaks. For risk assessment four different zones (safe, caution, dangerous and critical) of the level of the variable under study (pH) were defined, each

zone equating to a particular level of risk. Having identified the hazards, associated risks and intrinsic parameters of the pate, a Hazard Analysis Critical Control Point (HACCP) system can be more readily established using predicted outcomes from FMM. General guidance on generic uses is also discussed. AA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

Antioxidants

838
Milic (BL), Djilas (SM) and Canadanovic-Brunet (JM). **Antioxidative activity of phenolic compounds on the metal-ion breakdown of lipid peroxidation system.** *Food Chemistry* 61(4); 1998; 443-447

The generation of a lipid alkoxyl ($LO^{\cdot}$) radical as a result of metal-ion breakdown of hydroperoxide-enriched methyl linoleate of sunflower oil has been established by a combination of spin trapping and electron spin resonance (ESR) spectroscopy. Antioxidative activities of gallic, caffeic, chlorogenic, vanillic and salicylic acids at concn. of 0.5, 1.0 and 2.0 mmol were studied in a lipid peroxidation system. The results show that the investigated phenolic compounds scavenge alkoxyl radical. This activity depends on the structure of the molecules, and number and position of the hydroxyl group in the molecules; it is increased in the order gallic > caffeic > chlorogenic > vanillic > salicylic acids. AA

Stabilizers

Gum arabic

839
Al-Othman (AA), Al-Shagrawi (RA), Hewedy (FM) and Hamdi (MM). **Plasma total, lipoprotein cholesterol, organs cholesterol and growth performance in rats fed dietary gum arabic.** *Food Chemistry* 62(1); 1998; 69-72

Thirty two male Wistar rats with initial body wt ranging from 45 to 55 g were randomly assigned to 4 dietary treatments. Rats were fed with *ad libitum* access diets containing 7.5% as cellulose or gum arabic (GA) with or without 1% added cholesterol for 5 wk. Final body wt., body wt. gain and feed efficiency ratio were comparable in all groups. Within cholesterol-fed groups, the cholesterol concn. of plasma was significantly lower in rats fed diet supplemented with GA compared with those fed cellulose. Among cholesterol-fed groups, liver cholesterol was significantly higher in the group fed diet supplemented with GA compared with those fed cellulose. In rats fed cholesterol-free diets, the cholesterol levels of plasma, LDL, HDL and liver were comparable. AA

Sweeteners

840
Hutchinson (SA), Ho (GS) and Ho (C-T). **Stability and degradation of the high-intensity sweeteners: Aspartame, alitame, and sucralose.** *Food Reviews International* 15(2); 1999; 249-261

Aspects considered in this article include: aspartame (degradation and stability of aspartame, reactions between aspartame and other compounds), alitame (decomposition and stability of alitame, stability of alitame in the presence of glucose, volatile compounds produced in the reaction of alitame with glucose) and sucralose (decomposition and stability of sucralose, release of chloride ions from aqueous sol. of sucralose and sucralose/glycine, volatile compounds produced in the thermal decomposition of sucralose and thermal reaction of sucralose with glycine). 25 references. BV

841

Kawase (S), Matsumura (Y), Murakami (H) and Mori (T). **Comparison of antioxidative activity among three types of prolamin subunit.** *Journal of Cereal Science* 28(1); 1998; 33-41

The antioxidative effects of three prolamins, α/β-gliadin, C hordein and α-zein, were investigated in powders in which the prolamin under test encapsulated peroxide-free ethyl esters of the unsaturated fatty acids, linoleic, α(γ)-linolenic, arachidonic, eicosapentaenoic and docosahexaenoic acids. All prolamins inhibited the autoxidation of ethyl esters of linoleic, linolenic and arachidonic acids, i.e. with two to four unsaturated bonds. C hordein protected an eicosapentaenoic acid ethyl ester from autoxidation in the powder system for 7 days, whereas other prolamins were less effective. None of the prolamins completely inhibited the autoxidation of docosahexaenoic acid ethyl ester. AA

842

Akerberg (A), Liljeberg (H) and Bjorck (I). **Effects of amylose/amylopectin ratio and baking conditions on resistant starch formation and glycaemic indices.** *Journal of Cereal Science* 28(1); 1998; 71-80

The possibility of improving the nutritional properties of starch in barley flour-based bread, by use of high-amylose barley, was studied. Breads were made from 70% whole meal barley flour and 30% white wheat flour. Test breads were baked from waxy barley (WB), ordinary barley (OB), ordinary glacier barley (OGB) and high-amylose barley (HAB). The resistant starch (RS) content and rate of starch hydrolysis were measured *in vitro*. The amount of RS (total starch basis varied from < 1% WB) to approx. 4% (HAB) in conventionally baked bread and from 2% to 10% in the corresponding long-time/low temp. baked products. GS

843

Bredie (WLP), Mottram (DS), Hassell (GM) and Guy (RCE). **Sensory characterisation of the aromas generated in extruded maize and wheat flour.** *Journal of Cereal Science* 28(1); 1998; 97-106

The effects of extrusion temp., moisture and residence time (RT) on flavour generation in maize and wheat flours processed by direct extrusion cooking have been investigated using quantitative descriptive aroma profiling. Temp. and moisture level were important variables influencing the aroma generation in extrusion of both maize and wheat flour. Changing RT from 35 to 60 s had a relatively small effect on the aroma of extruded maize. A greater effect of RT on aroma generation was noted for extruded wheat flour. The maize and wheat extrudates were described by similar aroma vocabularies, although low-intensity sulphury and musty notes were observed in the extruded wheat. The extrudates from the lowest extrusion temp. (120°C) and higher moisture levels (18 and 22%) were mainly characterised by porridge-like, cooked milk, cooked vegetable terms. At the intermediate conditions (150°C and 18% moisture), popcorn, toasted and puffed wheat notes dominated the extrudates from both cereals, with the popcorn note more characteristic for the extruded maize samples. The popcorn aroma was lower in the extrudates prepared under the most severe conditions (180°C and 14% moisture), where puffed wheat, burnt and toasted aromas were scored at relative high intensity. AA

844

Wang (L) and Flores (RA). **The effects of storage on flour quality and baking performance.** *Food Reviews International* 15(2); 1999; 215-234

This review compiles the published studies related to wheat and flour aging. Physical and chemical changes during wheat aging (WA), effects of WA on milling properties, physical and chemical changes during flour storage, effects of aging on dough rheology and baking properties, effects of aging on different wheat classes, wheat starch, wheat protein, wheat lipids, nutritional value and methods to accelerate flour aging (heating, moistering, aerating and chemical treatment) are the aspects covered. Many references. SRA

Barleys

845

Koksel (H), Celik (S) and Ozkara (R). **Effects of γ-irradiation of barley and malt on malting quality.** *Journal of the Institute of Brewing* 104(2); 1998; 89-92

Two two-rowed barley cvs., Tokak and Clerine, were irradiated at 2 different dose ranges (0.05-0.75 kGy and 0.5-5.0 kGy) using a ^{60}Co source. Irradiation of barley at the medium levels before malting had detrimental effects on most of the malt quality criteria. The detrimental effects of irradiation was lower at doses up to 0.25 kGy. Irradiation of malt samples caused either slight or no deterioration of quality characteristics. AA

846

Psota (V) and Prochazka (S). **IAA, ABA and germination of spring barley caryopses during post-harvest maturation.** *Journal of the Institute of Brewing* 104(2); 1998; 105-107

847

Home (S). **Determination of repeatability and reproducibility of the revised method for germinative capacity.** *Journal of the Institute of Brewing* 104(2); 1998; 69

The method for the detn. of germinative capacity of barley using H_2O_2 and peeling technique (EBC 3.5.2) was revised in 1995. The revised procedure has been collaboratively tested by the EBC Analysis Committee. The repeatability (r_{95}) and reproducibility (R_{95}) values were dependent upon mean values, r_{95} = (64.23 - 0.64 m)% and R_{95} = (51.74 - 0.50 m)%. AA

Rice

848

Veena Pal, Pandey (JP) and Sah (PC). **Effect of degree of polish on proximate composition of milled rice.** *Journal of Food Science and Technology (India)* 36(2); 1999; 160-162

Milled rice samples of different degrees of polish (0-11.35%) obtained by varying the time of milling were evaluated for proximate composition (proteins, fat, ash and carbohydrates). The data revealed that the proteins, fat and ash contents decreased linearly with increase in degree of polish, as these constituents were mainly conc. in the peripheral layers of kernel, which were removed during polishing. AA

849

Daniels (MJ), Marks (BP), Siebenmorgen (TJ), McNew (RW) and Meullenet (JF). **Effects of long-grain rough rice storage history on end-use quality.** *Journal of Food Science* 63(5); 1998 832-835

Rough rice (cv. Cypress) from the 1995 season was harvested, dried, and stored in laboratory-scale studies. Treatments included pre-drying conditions drying conditions, storage temp., and storage durations. Temporary wet storage prior to drying affected cooking properties ($P < 0.005$) and peak viscosity ($P < 0.005$). Drying treatments affected head rice yield ($P < 0.005$), cooking properties ($P < 0.001$), and peak viscosity ($P < 0.05$). Stor[illegible] was related ($P < 0.05$) to cooking properties and peak viscosity via a second-order relationship. Head rice yield and cooking properties were also affected ($P < 0.05$) by storage duration. AA

850

Kohyama (K), Ohtsubo (K), Toyoshima (H) and Shiozawa (K). **Electromyographic study on cooked rice with different amylose contents.** *Journal of Texture Studies* 29(1); 1998; 101-113

The texture of 6 var. of cooked rice with different amylose contents was measured with a Texturometer. Masticatory behaviour of the rice was evaluated using electromyography (EMG) of masticatory muscles. Differences in mastication patterns among the 7 subjects examined were greater than between rice var. Masticatory behaviour was more related to the adhesiveness and stickiness of rice as measured using a Texturometer than to the hardness. The number of chews and masticatory time, total duration of mastication and total muscle activities were highly correlated with each other, and were greater in cooked rice with a high amylose content, which showed low adhesiveness and stickiness values using a Texturometer. Cooked rice with a high amylose content was masticated with high masseter muscle activities. The ratio of jaw-opening muscle activity to the preceding jaw-closing muscle activity was low in high-amylose var., which corresponds to the ratio of stickiness to hardness using a Texturometer. Between-sample differences in mastication parameters were more apparent in the early stage of mastication, and no significant difference was observed in the late stage. AA

851

Kaur (K), Singh (N), Sekhon (KS) and Singh (B). **Effect of hydrocolloids and process variables on**

the extrusion behaviour of rice grits. *Journal of Food Science and Technology (India)* 36(2); 1999; 127-132

Investigations were carried out to study the effects of incorporating various hydrocolloids viz., carboxymethyl cellulose (CMC), sodium alginate and gum acacia at different levels (1, 2 and 3%) and processing variables such as feed moisture and barrel temp. on the extrusion behaviour and product characteristics of rice grits. Specific energy consumption (SEC) decreased with increase in the levels of all types of hydrocolloids. Die pressure of extruder progressively increased with the increase in the level of sodium alginate and CMC, while the reverse was true for gum acacia. Expansion ratio and water absorption index (WAI) increased whereas, density decreased with the addition of all types of hydrocolloids. However, the intensity of increase in WAI varied with the type of hydrocolloid. Viscosity of ground extrudates increased with the addition of CMC and decreased with sodium alginate and gum acacia. Feed moisture and barrel temp. showed pronounced effects on the viscosity of all extrudates. AA

Ryes

852

Greiner (R), Konietzny (U) and Jany (K-D). **Purification and properties of a phytase from rye.** *Journal of Food Biochemistry* 22(2); 1998; 143-161

Phytase (myo-inositol hexakisphosphate phosphohydrolase) has been purified about 2,000-fold from ungerminated rye with a recovery of 6%. The enzyme behaves as a monomeric protein of a mol. mass of about 67 kDa. Optimal pH for the degradation of phytate has been found at pH 6.0 and 45°C. Kinetic parameters for the hydrolysis of Na-phytate are K_M 300 µM and k_{cat} 358 s^{-1} at 35°C and pH 6.0. The rye enzyme exhibits a broad affinity for various phosphorylated compounds and hydrolyses phytate in a stepwise manner; the pentakis- and tetrakisphosphate were identified as I(1,2,3,4,5)P_5 and I(2,3,4,5)P_4. Consequently, this enzyme is a 6-phytase (EC 3.1.3.26). AA

Wheat

853

Manohar (RS), Manohar (B) and Rao (PH). **Rheological characterization of wheat porridge (cooked *dalia*), a semi-liquid breakfast food.** *Journal of Cereal Science* 27(1); 1998; 103-108

Rheological characteristics of wheat porridge made from wheat grits (*dalia*) obtained from both polished and unpolished wheat were studied. Wheat porridge exhibited pseudoplastic behaviour at all temp. studied. A power law equation adequately described the relationship, and the correlation coeff. were from 0.989 to 0.999. Flow behaviour indices varied from 0.44 to 0.57 and were affected by polishing of wheat. Consistency indices decreased with temp. and the Arrhenius equation was used to describe the dependence. Activation energies varied from 24.83 to 34.50 kJ/mol. AA

854

Kovacs (MIP), Howes (NK), Clarke (JM) and Leisle (D). **Quality characteristics of durum wheat lines deriving high protein from a *Triticum dicoccoides* (6b) substitution.** *Journal of Cereal Science* 27(1); 1998; 47-51

855

Verbruggen (IM), Veraverbeke (WS), Vandamme (A) and Delcour (JA). **Simultaneous isolation of wheat high molecular weight and low molecular weight glutenin subunits.** *Journal of Cereal Science* 28(1); 1998; 25-32

A procedure was established for isolating simultaneously high mol. wt. (HMW-GS) and low mol. wt. glutenin subunits (LMW-GS) from chloroform-defatted wheat flour. Temp. conditions were optimised to obtain max. yield and purity. A pre-extraction of gliadin was performed with 50% (v/v) propan-1-ol at room temp. Glutenin subunits were solubilised from the residue at 60°C with 50% (v/v) propan-1-ol containing 1% (w/v) dithiothreitol. The HMW-GS in the glutenin mixture were then precipitated selectively by increasing the propan-1-ol concn. to 60%. Upon addition of propan-1-ol to a final concn. of 85%, LMW-GS were precipitated. It was shown by densitometric scanning of SDS-PAGE gels that the isolated glutenin subunits were very pure. Furthermore, a partial separation of LMW-GS into B and C type subunits was observed when the propan-1-ol concn was increased gradually. AA

856

Zhao (XC), Batey (IL), Sharp (PJ), Crosbie (G), Barclay (I), Wilson (R), Morell (MK), Appels (R). **A**

single genetic locus associated with starch granule properties and noodle quality in wheat. *Journal of Cereal Science* 27(1); 1998: 7-13

An extensive survey of wheat cvs. showed a complete association between the presence of a granule bound starch synthase (GBSS-4A) null mutation and the classification of the respective cv. into the white salted noodle category. Since flour swelling vol. (FSV) is a standard assay of flour used to identify cvs. that have potential for the production of white salted noodles, the results of the survey were investigated further by studying the genetic association of GBSS-4A null genotypes and FSV. A study of 34, F2 derived families, from a cross between wheat cvs. Reeves (good noodle texture, high FSV) and Kulin (poor noodle texture, low FSV), provided clear evidence for the genetic association of a granule bound starch synthase (GBSS-4A) null mutation and FSV. The mol. basis for the affect of the GBSS-4A null mutation was not simply due to a decrease in amylose content in the starch granules. Instead, the null mutation most likely causes a subtle change in starch structure as indicated by the association of high starch viscosity with high FSV and the GBSS-4A null genotype. The study suggests that assaying for the GBSS-4A null mutation at the DNA level may provide a valuable screen for noodle quality at early stages in a breeding program aimed at good white salted noodle quality. AA

857

Shomer (I), Lookhart (GL), Vasiliver (R) and Bean (S). **Ultrastructure of consecutively extracted and flocculated gliadins and glutenins.** *Journal of Cereal Science* 27(1); 1998; 27-36

858

Fujita (S), Yamamoto (H), Sugimoto (Y), Morita (N) and Yamamori (M). **Thermal and crystalline properties of waxy wheat (*Triticum aestivum* L.) starch.** *Journal of Cereal Science* 27(1); 1998; 1-5

The physico-chemical properties of starch granules derived from waxy wheat were examined using spectrophotometry of their starch-iodine complexes, differential scanning calorimetry (DSC) and X-ray diffraction. DSC data showed a strong correlation between peak temp. and the enthalpy change for starch gelatinization for all samples; likewise, X-ray diffraction data also correlated with these gelatinization parameters. On the other hand there were no differences in the mean value of the diam. of starch granules between samples. It was concluded that the thermal properties of waxy wheat starch are adequately explained by its crystallinity AA

859

Bonnin (E), Goff (AL), Saulnier (L), Chaurand (M) and Thibault (J-F). **Preliminary characterization of endogenous wheat arabinoxylan-degrading enzymic extracts.** *Journal of Cereal Science* 28(1) 1998; 53-62

Endogenous arabinoxylan-degrading enzymes in wheat were investigated in extracts of whole grains and tissues. Crude enzymes from two European cvs. were observed to hydrolyse various substrates, such as o-nitrophenyl β-D-xylopyranoside, p-nitrophenyl α-L-arabinofuranoside, xylan and water-extractable and water-unextractable wheat arabinoxylans. Viscosity measurements and gel permeation chromatography of digests of arabinoxylans by crude extracts indicated the presence of endo-acting enzymes. Moreover, high-performance anion-exchange chromatography showed that monomers (arabinose, xylose) and small xylooligosaccharides were also released. Wheat var. and harvest yr. were shown to have little influence on the level of activity. Grains were fractionated on a laboratory mill and assays of the crude extracts obtained from the different fractions showed that the inner tissues were less active towards arabinoxylans and model substrates than the outer. AA

860

Muller (S), Wieser (H) and Popineau (Y). **Disulphide bonds of r46-gliadin.** *Journal of Cereal Science* 27(1); 1998; 23-25

861

Rouau (X) and Surget (A). **Evidence for the presence of a pentosanase inhibitor in wheat flours.** *Journal of Cereal Science* 28(1); 1998; 63-70

The inhibitory effect on fungal pentosanase preparations was studied using the solubilisation of arabinoxylan from wheat endosperm cell wall as an assay of activity. The solubilisation, by a pentosanase preparation from *Aspergillus niger*, of arabinoxylans from water-unextractable pentosans (WUP) isolated from wheat flour was much reduced when carried out in flour extracts as, instead of pure buffer. Heating at 100°C and centrifugation of the

flour extracts removed approx. one-third of the soluble protein, but very low amounts of arabinoxylan. GS

862

Tamas (L), Bekes (F), Greenfield (J), Tatham (AS), Gras (PW), Shewry (PR), Appels (R). **Heterologous expression and dough mixing studies of wild-type and mutant C hordeins.** *Journal of Cereal Science* 27(1); 1998; 15-22

Wild type and mutant (cysteine-containing) forms of C hordein were expressed in *Escherichia coli*. Incorporation of a mutant form with N- and C-terminal cysteine residues into dough using a 2 g Mixograph showed similar positive effects on dough strength to the incorporation of HMW subunit 1Bx7. Co-incorporation showed that the effects of the two proteins were additive. In contrast, the incorporation of wild type C hordein or mutants with single cysteines at the N- or C-terminus resulted in decreased dough strength, with the two mutant forms inhibiting the positive effect of 1Bx7. Analysis of total protein extracts from the doughs indicate that the differences resulted from alterations in the proportions of gluten monomers, small gluten polymers and large gluten polymers. AA

863

Sidhu (JS), Singh (J) and Bawa (AS). **Influence of carboxy methyl cellulose on rheological, gas formation and gas retention properties of Punjab wheat variety.** *Journal of Food Science and Technology (India)* 36(2); 1999; 139-141

Incorporation of different concn. of carboxy methyl cellulose (CMC) has been investigated to study its effect on the rheological, gas formation and gas retention properties of Punjab wheat var. 'HD 2329'. Addition of 0.5% CMC increased water absorption from 66 to 67.4%, dough development time by 0.5 min, mixing tolerance index by 20 BU, max. dough height by 17.4 mm, max. height of CO_2 production by 2.7 mm whereas, the time at which max. height occurred was increased by 7 min, peak viscosity decreased by 180 BU, viscosity at 95°C by 340 BU, viscosity after 15 min cooking at 95°C by 360 BU, viscosity at 50°C by 620 BU and set back on cooling by 160 BU, resp. at 0.5% level of incorporation. AA

Corn

864

Li (Y), Kloeppel (KM) and Hsieh (F). **Texture of glassy corn cakes as a function of moisture content.** *Journal of Food Science* 63(5); 1998; 869-972

Glass transition temp. (T_g) of yellow and white corn cakes were investigated within the moisture range of 2 to 32% (w/w) using dynamic differential scanning calorimetry. All measurements were conducted at 10°C/min heating rate, 30 sec equilibrium period, and 1°C amplitude. Effects of water plasticization on corn cakes were predicted by the Gordon-Taylor's equation. Moisture sorption isotherms were established using BET and GAB equations. Relationships were found among T_g, moisture content and cake texture. The loss of crispness of corn cakes occurred within the glassy state. The initial loss of crispness occurred around monolayer moisture content, and the complete loss of crispness occurred at about 9% moisture with the highest hardness. AA

865

Konstance (RP), Onwulata (CI), Smith (PW), Lu (D), Tunick (MH), Strange (ED), Holsinger (VH). **Nutrient-based corn and soy products by twin-screw extrusion.** *Journal of Food Science* 63(5); 1998; 864-868

Extruder conditions for various blends (20% protein, 12% fat, 68% carbohydrate and 8-18% moisture and 100-130°C extrusion temp.) using soy isolates, and/or soy conc. to produce a final precooked product that would exhibit minimal tripsin inhibition was determined and compared favourably with porridges from existing corn soy-blends in consistency and colour. The extrusion of lower valued conc. at 100-115°C with 12-18% moisture produced a precooked mix that was high in nutrients high available lysine, and free of trypsin inhibitor. The extrudate could be ground to a powder form that would match the colour of current corn-soy blends. With slight alteration of conditions it was possible to develop consistencies that would enable products ranging from porridges or gruels to beverages. SRA

866

Janardhana (GR), Raveesha (KA) and Shetty (HS). **Modified atmosphere storage to prevent mould-induced nutritional loss in maize.** *Journal of the Science of Food and Agriculture* 76(4); 1998; 573-578

Effect of modified atm. storage systems having 60% CO_2, 40% CO_2 and 20% CO_2 in combination with N_2 and O_2 were studied on freshly harvested maize grain (var. Deccan-103) to prevent moulding and loss of food reserves. Under favourable conditions of 90% RH and at 25 plus or minus 2°C, maize grains having 15 and 20% moisture content stored for 45 days revealed significant postponement of visible moulding and the loss of food reserves. The results showed that, maize grain with 15% moisture content does not support mould growth even after 45 days of storage, as a result loss of food reserves reduced considerably. Visible moulding was postponed by 15 days under 60% CO_2 and 40% CO_2 atm. in grains with 20% moisture contents and he loss of food reserves in MAS treated samples were significantly reduced over the untreated maize grains. DM loss (DML) was also significantly reduced under 60% CO_2 modified atm. in maize grains with 20% moisture content. AA

867

Desrumaux (A), Bouvier (JM) and Burri (J). **Corn grits particle size and distribution effects on the characteristics of expanded extrudates.** *Journal of Food Science* 63(5); 1998; 857-863

The effects of corn particle size and distribution on the extrusion-cooking in a twin-screw corotating extruder were studied. The effects of particle characteristics were elucidated by analyzing process responses, expansion criteria and extrudate structure. When grits had the same biochemical composition, an increase in feed particle size gave harder extrudates, reduced longitudinal expansion and caused large cell size and lower density. Particle size distribution had no significant effects. Extrudate expansion correlated with the driving force of melt expansion at the die [$\Delta P/(\mu_a)d$]. SRA

Sorghum

868

Igyor (MA), Ogbonna (AC) and Palmer (GH). **Effect of malting temperature and time on enzyme development and sorghum wort properties.** *Journal of the Institute of Brewing* 104(2); 1998; 101-104

The effect of malting temp. and time on enzyme development and wort properties of an improved Nigerian sorghum cv. (Ex-Kwara) were investigated. Malting was carried out at two temp. regimes, 20°C and 25°C for 8 days. Parameters evaluated included α- and β-amylase development, hot water extract (HWE), soluble extract, fermentability, fermentable extract, viscosity, filtration rate, reducing sugars, α-amino nitrogen and total soluble nitrogen (TSN). For virtually all the parameters studied, germination at 25°C produced higher values on the 4th day after which temp. appeared to have little influence. α-Amylase development continued throughout the germination period while β-amylase peaked on the 6th day. Optimal values of total soluble nitrogen (TSN) were recorded at both 25°C and 20°C at the 6th and 8th day of germination resp. AA

PULSES

869

Chau (C-F) and Cheung (PC-K). **Functional properties of flours prepared from three Chinese indigenous legume seeds.** *Food Chemistry* 61(4); 1998; 429-433

The functional properties of *Phaseolus angularis*, *Phaseolus calcaratus* and *Dolichos lablab* flours were investigated and compared with those of soybean flour. The min. nitrogen solubilities of *P. angularis* and *P. calcaratus* flours were at pH 5 while that of *D. lablab* flour was at pH 4. Compared with soybean flour, *P. angularis*, *P. calcaratus* and *D. lablab* flours exhibited lower foam capacities, water- and oil-holding capacities, but higher gelation capacities. The emulsifying activities and emulsion stabilities of all legume flours tested were pH-dependent with min. values at pH 4. Their emulsion stabilities were > 80.2% from pH 2 to 10, except at pH 4. Foam capacities and stabilities were also pH dependent, highest foam stabilities being at pH 4. AA

870

Chau (C-F), Cheung (PC-K) and Wong (Y-S). **Chemical composition of three underutilized legume seeds grown in China.** *Food Chemistry* 61(4); 1998; 505-509

Proteins of *Phaseolus angularis*, *Phaseolus calcaratus* and *Dolichos lablab* seeds (24.9 to 26.5% dry wt.) were mainly contributed by their cotyledons which had a proportion of 82.9 to 90.8% by wt. of the whole seeds. The levels of all the essential amino acids of the legume seeds (415 to 443 mg g^{-1} protein) were above the FAO/WHO requirement with the essential amino acid scores of the methionine and cystine being 1.02 to 1.19. Appreciable amounts of oligosaccharides of the raffinose family were found mainly in the cotyledons (3.52 to 4.72% dry wt.). The total dietary fibre of the legume seeds (13.5 to 19.3% dry wt.) consisted predominantly of insoluble dietary fibre (IDF). The cotyledons contained 45.9 to 51.4% dry wt. of starch but had low contents of cellulose and lignin. Hulls were highly lignified and consisted predominantly of IDF, with values ranging from 70.7 to 74.0% dry wt. The principal sugar residue analysis revealed that pectins were the major polysaccharide present in the SDF of both the cotyledons and the hulls. While xylans and cellulose were the major polysaccharides present in the IDF of the hulls, xyloglucans and arabinose-rich pectic substances were the principal non-starch polysaccharides in the IDF of the cotyledons. AA

Chickpeas

871

Clemente (A), Sanchez-Vioque (R), Vioque (J), Bautista (J) and Millan (F). **Effect of cooking on protein quality of chickpea (*Cicer arietinum*) seeds.** *Food Chemistry* 62(1); 1998; 1-6

Amino acid composition and *in vitro* protein digestibility (PD) of cooked chickpea (CP) were determined and compared to raw CP seeds. Heat treatment (HT) produced a decrease of methionine, cysteine, lysine, arginine, tyrosine and leucine, the highest reductions being in cysteine (15%) and lysine (13.2%). Protein content declined by 3.4% and *in vitro* PD improved significantly from 71.8 to 83.5% after cooking. The decrease of lysine was higher in the cooked CP seeds than in the heated protein fractions, globulins and albumins. The structural modification in globulins during HT seems to be the reason for the increase in PD, although the activity of proteolytic inhibitors in the albumin fraction was not reduced. Results suggest that appropriate HT may improve the bioavailability of CP proteins. AA

Cowpeas

872

Ojimelukwe (PC) and Okoronkwo (S). **Effect of preservation with *Xylopia aethiopica* on the shelf-life of cowpea seeds.** *Journal of Food Science and Technology (India)* 36(2); 1999: 170-172

A popular cowpea var. "life-brown" was used for experiments. Optimal concn. of *Xylopia aethiopica* required for storage of whole cowpea seeds was determined in petri dishes. Whole cowpea seeds were stored in white and black polyethylene bags (WPB and BPB), clay pots (CP) and plastic cans (PC) using 0.5 g *Xylopia aethiopica* dust per 100 g cowpeas. Physico-chemical properties of the seeds were monitored on a biweekly basis for 24 wks. By the end of the storage period, increase in the moisture content of cowpeas stored in PC was found to be the lowest (38%), while that of BPB was the highest (205%). Seeds stored in PC retained 92% of their viability, while those stored in BPB were no longer viable. Seeds stored in CP had the highest number of insect emergent holes. Reconstitutability and foam properties of cowpea seeds stored in BPB and CP were markedly lowered. PC and WPB were better storage containers than CP and BPB. Seeds stored with *X. aethiopica* were more acceptable than controls. AA

Faba beans

873

Cepeda (E), Villaran (MC) and Aranguiz (N). **Functional properties of faba bean (*Vicia faba*) protein flour dried by spray drying and freeze drying.** *Journal of Food Engineering* 36(3); 1998: 303-310

Faba protein flour of *Vicia faba* was obtained by precipitation and centrifugation from peeled and milled seeds. The flour was dried by spray drying and freeze drying. The effect of both methods of drying on functional properties such as solubility, emulsification, water retention, viscosity and enzymatic hydrolysis was studied. AA

Red gram

874

Mulimani (VH) and Devendra (S). **Effect of soaking, cooking and crude α-galactosidase treatment on the oligosaccharide content of red gram flour.** *Food Chemistry* 61(4); 1998; 475-479

The contents of sucrose, raffinose, stachyose, verbascose, total soluble sugars and reducing sugars in whole seeds of 14 cvs. of red gram (*Cajanus cajan*) grown in Karnataka state were determined. The effects of soaking, cooking and crude α-galactosidase treatment on the levels of the raffinose family of sugars were investigated. The percent losses of raffinose, stachyose and verbascose after soaking the red gram seeds for 16 h were 54.6, 55.4 and 33.3%, resp. Cooking the red gram seeds for 60 min resulted in a decrease of 80.2% for raffinose, 87.2% for stachyose and 81.6% for verbascose. Thin-layer chromatographic analyses of 4 h enzyme-treated samples revealed complete hydrolysis of galactooligosaccharides. Therefore, α-galactosidase from *Cassia sericea* could have potential use in the food industry. AA

Winged beans

875

Chimmad (BV), Meera Rao, Megeri (SN) and Yenagi (NB). **Physico-chemical characteristics and nutrient composition of winged bean (*Psophocarpus tetragonolobus* (L.) DC) seeds.** *Journal of Food Science and Technology (India)* 36(2); 1999; 118-122

Winged bean (*Psophocarpus tetragonolobus* (L.) DC) is an under-utilized grain legume. Significant differences in physico-chemical characteristics and nutrient composition were observed in 46 genotypes of winged bean seeds. Hundred seed wt. (28.7 g), vol. (25.02 ml) and hard-to-soak seeds (32.78%) were high. Hydration capacity (0.22 g/seed), hydration index (58.37), swelling capacity (0.17 ml/seed), swelling index (68.97), increase in wt. (97.53%) and vol. (122.58%) and leached solids (19.46%) after cooking were low in winged bean seeds. The seeds were rich in crude proteins (33.70%) and fat (17.74%). Pre-soaked pressure cooked seeds although attained cooked texture, the cookability was not uniform. AA

Almonds

876

Seron (LH), Poveda (EG), Moya (MSP), Carratala (MLM), Berenguer-Navarro (V), Grane-Teruel (N) **Characterization of 19 almond cultivars on the basis of their free amino acids composition.** *Food Chemistry* 61(4); 1998; 455-459

Several multivariate techniques (ANOVA, principal components analysis, cluster, linear discriminant function) were applied to the chromatographic data on free amino acids for a set of 19 almond cvs. It is concluded that the cvs. studied have significantly different free amino acid patterns. The information provided by multivariate techniques using amino acids is complementary to that obtained from fatty acid composition. Spanish cvs. can be successfully classified as a single class different from the rest. Cvs. Texas, Genco and Wawona have such peculiar patterns that each of them can be considered as a consistent class. Cvs. Titan and Non Pareil associate either with the Spanish cvs. or with the American in function of amino acids processed. AA

Mustard

877

Cejpek (K), Urban (J), Velisek (J) and Hrabcova (H). **Effect of sulphite treatment on allyl isothiocyanate in mustard paste.** *Food Chemistry* 62(1); 1998; 53-57

Allyl isothiocyanate (AITC), the major constituent of black and brown mustard oils, reacts with hydrogen sulphite, used as an antioxidant in some types of mustard paste, to afford allylaminothio carbonylsulphonate (AITC-SO_3^-). The reaction was studied in a model aqueous system of pH 4 and mustard paste of the Dijon type, resp. The reaction rate was influenced considerably by temp., but not by oxygen dissolved in the media. About 10% of total AITC (c_{tot}[AITC] = 1.81 g kg^{-1}) in the mustard paste treated with bisulphite ($c_0[K_2S_2O_5]$ = 1.5 g kg^{-1}) converted to AITC-SO_3^- within a period of 4 wk. regardless of storage temp. used. The primary reaction product, AITC-SO_3^-, showed good stability both in diluted acidic sol. and mustard paste. A rapid decomposition of this adduct was observed in diluted

alkali (pH 9). A method for the simultaneous detn. of AITC-SO_3^- and AITC in mustard paste was developed and its performance characteristics assessed. Sensory analysis revealed slight fading of characteristic mustard flavour and the appearance of garlic-like flavour in model sol. In mustard pastes, the original pungent flavour became much milder, but the development of garlic-like notes was not detected. AA

Soybeans

Soy products

878

Lopez (LMI), Brullo (A), Natalucci (CL), Caffini (NO), Sorgentini (DA), Wagner (JR). **Thermal behaviour, solubility and structural properties of soy concentrate hydrolyzed by new plant proteases.** *Journal of Food Biochemistry* 22(2); 1982; 125-141

A soy conc. prepared by alcoholic extraction of defatted soy flour was hydrolyzed with three plant proteases: hieronymin and macrodontin, cysteine proteases, and pomiferin, a serine protease. A commercial microbial protease (alcalase) was included for comparative purposes. Working at optimal conditions for each enzyme, 5-15% degree of hydrolysis (DH) values were obtained. Hydrolysates exhibited a characteristic SDS-PAGE pattern: the plant proteases attacked the polypeptides of 7S and 11S proteins with different intensity and selectivity, especially the A and B polypeptides of the 11S protein. Intermediate mol. wt. peptides (24 and 60 kDa) were produced as the hydrolysis progressed. Differential Scanning Calorimetry (DSC) thermograms of flour, conc. and hydrolysates were analyzed to evaluate the thermal stability and denaturation enthalpies of the major proteins. An increase in the degree of protein denaturation resulting from enzymatic action and a lower thermal stability at low pH were detected. The surface hydrophobicity of all hydrolysates, unlike expected, did not increase. Solubility at pH 7.0 is closely related to the DH, independent of the protease used. Solubility at pH 4.5 appeared to be related to the extent of hydrolysis of polypeptide A by each protease. AA

Vegetables

879

Favell (DJ). **A comparison of the vitamin C content of fresh and frozen vegetables.** *Food Chemistry* 62(1); 1998; 59-64

This study, using vitamin C (ascorbic acid) as 'marker', allowed a direct comparison of the nutritional quality of fresh vegetables at various stages of distribution and storage, with the same vegetable commercially quick-frozen and stored deep frozen for up to 12 months. The nutrient status of frozen peas and broccoli was similar to that of the typical market-purchased vegetable and was superior to peas that have been stored in-home for several days. Fresh peas and broccoli retained their quality for up to 14 days when stored under chill conditions. The nutrient status of frozen whole green beans and frozen carrots, with no loss on freezing, was similar to the fresh vegetable at harvest. Frozen spinach also compared reasonably well with the harvested fresh vegetable and was clearly superior to all market produce. AA

880

Berry (SK), Sehgal (RC), Beerh (OP) and Keshava (N). **Ready-to-use gravy for vegetable curry: Preparation, preservation and storage.** *Journal of Food Science and Technology (India)* 36(2); 1999; 109-113

A process was developed for the preparation of gravy with acceptable sensory quality for instant use in vegetable curries. Citric acid/acetic acid (0.8%) with or without the combination of sodium benzoate (600 ppm) was employed to extend the shelf-life of the product under ambient conditions (5 to 20°C during winter and 20 to 44°C during summer) for a period of over 12 months, while packed in glass jars as well as in flexible pouches. The microbial load in the stored gravy was well within the permissible limits observed for similar types of products. The physico-chemical characteristics of the preserved gravy did not show any significant change except for slight darkening of the colour on the surface and increase in reducing sugars during the storage period. The preserved gravy yielded good quality vegetable curries even when used after a storage for 12 months in flexible pouches. AA

881

Ok (T) and Hashinaga (F). **Identification of sugar-tolerant yeasts isolated from high-sugar fermented vegetable extracts.** *Journal of General and Applied Microbiology* 43(1); 1997; 39-47

882

Nicholl (P) and Prendergast (M). **Disinfection of shredded salad ingredients with sodium dichloroisocyanurate.** *Journal of Food Processing Preservation* 22(1); 1998; 67-79

Sodium dichloroisocyanurate (NaDCC) was used to disinfect salad vegetables. The efficacy of NaDCC in reducing total aerobic mesophile levels varies with vegetable type. NaDCC gives an acid pH in sol. and has significantly higher activity than sodium hypochlorite. For longer term storage, preparation of butter head lettuce which included a 30 min soak in NaDCC improved the microbiological quality of the produce at the end of the storage period. The microbial load on disinfected produce was between 0.62 and 0.98 log cycles lower than on lettuce prepared without a disinfection step for up to 11 days storage at 5°C. Results from sensory analysis indicate that the attributes of flavour, odour, colour, and crispness were not adversely effected by including a disinfection step in the preparation of shredded lettuce. With refrigerated storage there is some deterioration in flavour and crispness. Scores for flavour and odour increased with increasing concn. of free available chlorine used. AA

883

Prestamo (G) and Arroyo (G). **High hydrostatic pressure effects on vegetable structure.** *Journal of Food Science* 63(5); 1998; 878-881

The ultrastructural changes in spinach and cauliflower were determined after they were subjected to high hydrostatic pressure (HHP) treatment. When samples were treated at 400 MPa for 30 min at 5°C, the cellular structure changed and some migration of soluble compounds occurred, and the cell damage was clearly shown. The ultrastructure showed that parenchyma organization disappeared in spinach leave and cavity formation occurred after treatment. However, cauliflower exhibited a firm structure with a soaked appearance and would be more suitable than spinach for HHP treatment. SRA

Aroids

884

Bradbury (JH) and Nixon (RW). **The acridity of raphides from the edible aroids.** *Journal of the Science of Food and Agriculture* 76(4); 1998; 608-616

Beet sugar

885

Magne (V), Mathlouthi (M) and Robilland (B). **Determination of some organic acids and inorganic anions in beet sugar by ionic HPLC.** *Food Chemistry* 61(4); 1998; 449-453

This work deals with the identification and quantitative evaluation of sulphates, nitrates, chloride, acetic, lactic and formic acids. Detn. was carried out using a Dionex ion chromatograph with a conductivity detector. Different white and raw sugar samples have been analyzed with the aim of evaluating their quality. Organic acids production seems related to storage conditions rather than processing. Inorganic anions may be used to determine the crystallization quality. AA

Carrots

886

Barry-Ryan (C) and O'Beirne (D). **Quality and shelf-life of fresh cut carrot slices as affected by slicing method.** *Journal of Food Science* 63(5); 1998; 851-856

The effects of slicing method on the quality and storage of modified atm. packaged carrot slices were determined. The slicing method for ready-to-use carrots had strong effects on quality and shelf-life. Results confirmed that shelf-life may be extended by minimizing physical damage through the use of a sharp blade. Slicing caused physiological stress, physical damage and enhanced microbial growth. The milder slicing treatments led to higher appearance scores due to less cellular damage, lower permeability and lower levels of exudate, and this led to less off-odour development and greater retention of carrot aroma. SRA

Onions

887

Clark (SA), Shaw (ML), Every (D) and Lancaster (JE). **Physical characterization of allinase, the flavour generating enzyme in onions.** *Journal of Food Biochemistry* 22(2); 1998; 91-103

The characteristic flavour of onions occurs when the enzyme allinase (EC 4.4.1.4) hydrolyses the S-alk(en)yl-L-cysteine sulphoxides to form sulphur containing volatiles, pyruvate and ammonia. In this paper new evidence on the mol. mass of native onion allinase, its subunit size and its relationship to the predicted size from translation of the gene have been investigated. Allinase from bulbs was purified to homogeneity. Two isoforms of allinase were detected on ion-exchange chromatography. Both isoforms were analyzed by gel filtration FPLC. Allinase activity was detected at mol. masses of 59, 166 kDa and 59, 170 and 393 kDa for isoforms 1 and 2, resp. When analyzed by SDS-PAGE subunit sizes were determined to be 53.3 kDa for isoform 1 and 53.3 and 51.6 kDa for isoform 2. Amino terminal sequencing of both subunits confirmed they were allinase. Allinase was deglycosylated and the subunits migrated as a single band indicating a common protein backbone and varying glycosylation. Thus native allinase is a monomer, trimer and multimer of the subunits. Mol. analysis of allinase cDNA indicated that two genes and thus two protein subunits were expressed in onion bulb tissue. Translation is likely to have initiated from the third methionine of the leader sequence of the cDNA to give a protein backbone of 53.5 kDa in gradient SDS-PAGE. The functional significance of heterogenous subunits, from different genes, and multimeric native allinase remains unknown. AA

Potatoes

888

Marwaha (RS). **Chipping quality and related processing characteristics of Indian potato varieties grown under short day conditions.** *Journal of Food Science and Technology (India)* 36(2); 1999; 157-159

Ten commonly cultivated Indian potato var. grown under short day conditions were evaluated for chipping quality and for certain important processing characteristics immediately after harvest. DM contents of the var. ranged from 16.7-20.7%, while the reducing sugar contents varied between 92-332 mg/100 g fresh wt. Glucose constituted the major fraction of reducing sugars in all the var. 'Kufri Jyoti' had max. content of total phenols, while free amino acids were max. in var. 'Kufri Bahar'. There were large variations in the contents of free amino acids and total phenols among var. Fresh fried chips prepared from two var. viz., 'Kufri Sherpa', 'Kufri Lauvkar' were light in colour and acceptable. However, when morphological characters such as tuber size and shape were taken into consideration, only 'Kufri Lauvkar' was found most suitable for chipping. AA

889

Petersen (MA), Poll (L) and Larsen (LM). **Comparison of volatiles in raw and boiled potatoes using a mild extraction technique combined with GC odour profiling and GC-MS.** *Food Chemistry* 61(4); 1998; 461-466

Aromas of raw and boiled potatoes were compared using a mild extraction technique, ensuring preservation of the very labile composition of potato aroma during analysis. The extracts were evaluated by GC-MS and GC-sniffing using a panel of four judges. A total of 29 compounds were identified by GC-MS in raw potatoes and 25 in boiled. Twenty compounds were found in both raw and boiled potatoes, but most often in very different concn. During GC-sniffing, 33 odours were detected in boiled, and 27 in raw potatoes. Eight odours corresponded to compounds identified by GC-MS. Another four odours could be tentatively identified. It is concluded that the change in aroma during boiling of potatoes depends on compounds from lipid oxidation as well as compounds from other types of reactions, for instance the Strecker-degradation. AA

890

de Sotillo (DR), Hadley (M) and Wolf-Hall (C). **Potato peel extract a nonmutagenic antioxidant with potential antimicrobial activity.** *Journal of Food Science* 63(5); 1998; 907-910

The potato peel (PP) was examined for mutagenic activity using the *in vitro Salmonella typhimurium-Escherichia coli* microsome assay and found to be nonmutagenic. Plate count of PP revealed < 10 cfu/g. The antibacterial activity of PP was sp. dependent. It was effective only at high

concn. against gram negative and 1 g positive bacteria but it was bacteriostatic. SRA

891

Debon (SJJ), Tester (RF), Millam (S) and Davies (HV). **Effect of temperature on the synthesis, composition and physical properties of potato microtuber starch.** *Journal of the Science of Food and Agriculture* 76(4); 1998; 599-607

892

Juneja (VK), Martin (ST) and Sapers (GM). **Control of *Listeria monocytogenes* in vacuum-packaged pre-peeled potatoes.** *Journal of Food Science* 63(5); 1998; 911-914

Growth of *Listeria monocytogenes* on the surface of fresh peeled potatoes, treated with sulphite or a commercial browning inhibitor (CBI), packaged under vacuum and stored at 4, 15 and 28°C was determined. At 4°C, *L. monocytogenes* did not grow in all treated potatoes even after 21 days. At 15°C, *L. monocytogenes* grew to 7 $\log_{10}$ cfu/g within 12 days in the potatoes treated with sulphite or CBI. At 28°C, *L. monocytogenes* population was greater than 3 $\log_{10}$ cfu/g by 24 h in all samples regardless of treatment. Sulphites or a CBI appeared to provide a measure of safety in pre-peeled potatoes packaged under vacuum when kept at proper refrigeration temp. AA

Pumpkins

893

Esuoso (K), Lutz (H), Kutubuddin (M) and Bayer (E). **Chemical composition and potential of some underutilized tropical biomass: I. Fluted pumpkin (*Telfairia occidentalis*).** *Food Chemistry* 61(4); 1998; 487-492

The seeds of *Telfairia occidentalis* have been subjected to standard chemical analysis to evaluate their properties. Proximate analysis indicated a low moisture content (6.30 plus or minus 0.50%). The ash content was slightly higher than the range recommended for compounding of animal feed (3.44 plus or minus 0.06%). The carbohydrate content was low (16.5 plus or minus 0.12%). Starch, however, constituted the dominant carbohydrate (62.5 plus or minus 0.48), while three sugars, glucose, fructose and sucrose were detected in the seed. The crude protein in the seed was high (16.0 plus or minus 0.03%), a value which compared favourably with high protein seeds and nuts. In all, 16 amino acids were detected in the protein. Glutamic acid showed the highest concn. (16.4 g 100 g^{-1}), while lysine showed the lowest (2.6 g 100 g^{-1}). The brown oil extracted from the seed (yield 48.6 plus or minus 0.94) had the following physicochemical properties: acid value, 3.05 plus or minus 0.80 g, saponification value 166 plus or minus 1.34 mg/KOH g^{-1}, free fatty acids, 0.3 g and peroxide value 3.02 plus or minus 0.07 mg Eq kg^{-1}. The iodine value (80.1 plus or minus 0.10) g 100 g^{-1} indicated a preponderance of unsaturated fatty acid. Four fatty acids were detected whilst unsaturated acids constituted 61.3 g. Triglyceride was the dominant lipid sp. while hydrocarbons, waxes, sterols and sterol esters and higher alcohols, were detected in the unsaponifiable matter. Results of nutritionally valuable mineral elements indicated that potassium occurred at the highest concn. AA

Tomatoes

894

Errington (N), Tucker (GA) and Mitchell (JR). **Effect of genetic down-regulation of polygalacturonase and pectin esterase activity on rheology and composition of tomato juice.** *Journal of the Science of Food and Agriculture* 76(4); 1998; 515-519

Juices made from tomatoes containing antisense genes for the enzymes polygalacturonase (PGase) and pectin esterase isoform 2 (PEase) were compared to those made from normal fruit. The juice from the PGase fruit was thicker than that from the normal fruit. This increased viscosity was shown to develop in a time-dependent manner and may involve the continued action of PE in the juice post-homogenisation. The liquid phases of the juices did not differ greatly in viscosity and chemical composition indicating that it was the difference in the amount and nature of the solids that was responsible for the differences in consistency. Confocal microscopy and image analysis supported this hypothesis, showing that there were more intact cell-like structures present in the juice from genetically manipulated fruit. AA

895

Weemaes (C), Ludikhuyze (L), den Broeck (IV) and Hendrickx (M). **High pressure inactivation of polyphenoloxidases.** *Journal of Food Science* 63(5); 1998; 873-877

Pressure stabilities (PS) of polyphenoloxidases (PPO) from apples, avocados, grapes, pears and plums were determined at pH 6-7. These PPOs differed in pressure stability, but all were pressure stable. Inactivation of PPO from apple, grape, avocado and pear at room temp. (RT -25°C) became noticeable at approx. equal to 600, 700, 800 and 900 MPa resp. and followed first order kinetics. Plum PPO was not inactivated at RT at 900 MPa and activity reduction was detectable at 900 MPa and 50°C. Further increase in temp. resulted in increase of inactivation rate constant (IRC) (E_a approx. equal to 63 kJ/mol). In case of pear PPO, temp. increase upto 35°C resulted in a 3-fold reduction of the IRC. Only at higher temp. increase of the IRC with increasing temp. was noticed (E_a approx. equal to 120 kJ/mol). Pressure-temp. inactivation behaviour of PPO was dependent on the enzyme source. Increase or decrease of PS with increasing temp. and different relations between E_a (or Z_t) and pressure were observed. SRA

Acerola

896

Maciel (MIS), Melo (EDA), Lima (VLAGD), Silva (MRFD) and Silva (IPD). **Processing and storage of acerola (*Malpighia* sp.) fruit and its products.** *Journal of Food Science and Technology (India)* 36(2); 1999; 142-146

Studies were carried out on the storage time of frozen acerola fruit, fruit pulp and jelly (made by a new formulation) to assess the best conditions to preserve the nutritive value and organoleptic properties. The formulation developed for jelly consisted of 49% sucrose, 1% pectin and 50% of acerola juice. The results showed that low temp. (-18°C) stored frozen acerola fruits and pulp fruit retained vitamin C well. Total acidity and pH values for jelly, frozen acerola and pulp remained practically constant during the 180 days of storage and retained all the quality features of the products. Except those meant for further processing, the frozen storage for acerola fruits for a period longer than 30 days is not recommended as evidenced by the altered sensory characteristics of fruits. AA

Apples

897

Hwang (J-K), Kim (C-J) and Kim (C-T). **Extrusion of apple pomace facilitates pectin extraction.** *Journal of Food Science* 63(5); 1998; 841-844

Twin-screw extruder was employed to disintegrate apple pomace (AP) to facilitate production of apple pectins by water extraction. AP was extruded under different conditions of screw speed, 250-350 rpm; feed rate, 30-40 kg/h; moisture, 20-30%. The yield of water soluble polysaccharides (WSP) increased with increasing specific mechanical energy (SME), but intrinsic viscosity decreased with increasing SME. Considering both the WSP yield (g/dL) and intrinsic viscosity (dL/g), a dimensionless term, product yield x intrinsic viscosity (Y[η]), was an objective function for optimizing conditions for the solubilization of AP polysaccharides. Y[η] of pectins in extruded WSP ranged 0.59-1.34, while acid extracted WSP had Y[η] of 1.12. Extruded WSP with Y[η] comparable to acid extraction was obtained in the SME ranges of 110-170 kWh/h. AA

898

Barat (JME), Chiralt (A) and Fito (P). **Equilibrium in cellular food osmotic solution systems as related to structure.** *Journal of Food Science* 63(5); 1998; 836-840

The changes in wt., vol., and composition of apple tissue throughout equilibration in osmotic treatments were analyzed as a function of temp. and osmotic sol. concn. The effect of vacuum impregnation of the sample with osmotic sol. before osmotic treatment was also studied. Two periods were differentiated. First, compositional equilibrium was achieved in a relatively short time, depending on conditions. Then a bulk flux of osmotic sol. into the fruit tissue occurred due to relaxation of the previously shrunken cellular structure, because of pressure gradients. True chemical and mechanical equilibrium was marked by no further changes in sample composition or wt. AA

899

Rocha (AMCN), Brochado (CM) and Morais (AMMB). **Influence of chemical treatment on quality of cut apple (cv. Jonagored).** *Journal of Food Quality* 21(1); 1998; 13-28

The quality of a new var. of apple, 'Jonagored', after peeling and cutting was evaluated during ten days of storage in air at 4°C. The objective was to evaluate the shelf-life of apple cubes by detecting the limiting parameter and to test the influence of different chemical dips on the cut apple quality with the aim of extending shelf-life. Colour, i.e. browning at the cut surface, was found to be the critical quality parameter determining the shelf-life of the cut apple to less than three days. There were no significant differences between the dip treatments in measurements of CIE values. When apple cubes were treated with ascorbic acid, ascorbic acid plus $CaCl_2$ or ascorbic acid plus $CaCl_2$ and citric acid, the 0.75% ascorbic acid dip was found to be the most effective preservation treatment in terms of reducing colour change of the cut surface. Both 0.75% ascorbic acid and 0.75% ascorbic acid plus 0.75% $CaCl_2$ inhibited the loss of firmness of apple cubes. When citric acid was added to the dip treatment, there were colour changes similar to those of the control. AA

900

Fisher (TL) and Golden (DA). **Survival of *Escherichia coli* 0157:H7 in apple cider as affected by dimethyl dicarbonate, sodium bisulphite and sodium benzoate.** *Journal of Food Science* 63(5); 1998; 904-906

Survival of *Escherichia coli* 0157:H7 in apple cider containing no preservatives, 0.025% dimethyl dicarbonate (DMDC), 0.045% sodium benzoate (SB), 0.0046% sodium bisulphite (NaS; 65.5% SO_2), or a combination of NaS and SB (NaS/SB) and stored at 4, 10, and 25°C was evaluated. *E. coli* 0157:H7 survived for up to 18 days at 4, 10 and 25°C in unpreserved apple cider. At 4 and 10°C, DMDC was most efficient at inactivating *E. coli* 0157:H7., generally followed by NaS/SB SB, and NaS ($P < 0.05$). *E. coli* 0157:H7 was more resistant to preservatives at 4°C than at 25°C ($P < 0.05$). *E. coli* 0157:H7 was sublethally injured in cider containing preservatives, and to a lesser extent, in unpreserved cider. Generally, injury was more pronounced in cider containing DMDC, followed by NaS/SB. SB and NaS ($P < 0.05$). AA

901

Simal (S), Benedito (J), Sanchez (ES) and Rossello (C). **Use of ultrasound to increase mass transport rates during osmotic dehydration.** *Journal of Food Engineering* 36(3); 1998; 323-336

Experiments on osmotic dehydration of 1 cm apple cubes in 70°Brix sucrose sol. using ultrasound treatment were carried out at 40, 50, 60 and 70°C. Acoustic pressure and frequency was measured to characterize the ultrasonic bath. Mass transfer was described by Fick's unsteady state diffusion equation. An important influence of the sol. temp. on water transport was obtained. Measured water diffusivity coeff. (D_W) ranged from 2.6×10^{-10} $m^2 s^{-1}$ at 40°C to 6.8×10^{-10} $m^2 s^{-1}$ at 70°C. Similar sucrose gain was measured at different temp., with an av. effective sucrose diffusivity coeff. (D_S) (7.9 plus or minus 0.2) $\times 10^{-11}$ $m^2 s^{-1}$. Similar experiments were performed under dynamic agitation conditions. A significant decrease in water and solute transport rates was detected when agitation was applied instead of sonication. AA

Bananas

902

Kajuna (STAR), Bilanski (WK) and Mittal (GS). **Colour changes in bananas and plantains during storage.** *Journal of Food Processing Preservation* 22(1); 1998; 27-40

Two cvs., namely 'Cavendish' bananas (*Musa AAA* Group) and plantains (*Musa AAB* Group) were used to study the changes in their peel colour during storage at various temp. Gas-treated and nontreated fruits, and the $L^* a^* b^*$ system were used. The temp. effect on the colour parameters was mainly through the interaction with the gas treatment, var. and storage time; however, redness (a^*) for gas-treated bananas was expressed as $a^* = -20.1 + 0.14\ T\ D$, (T = temp., D = day). Similarly, $a^* = -27.5 + 55\ (T\ D)^{1/2} - 0.2\ T\ D$, predicted the degreening process in gassed plantains. The gas-treatment, storage time and var. all had a significant effect ($P < 0.01$) on the $L^* a^* b^*$ parameters. Plantains lost the greenness during storage faster than bananas. AA

Dates

903

Hobani (AI). **Rheological behaviour of date-water concentrates.** *Journal of Food Engineering* 36(3); 1998; 349-357

The rheological behaviour of date-water conc. of three date cvs. has been determined using a Haake VT 181 concentric-cylinder rotational viscometer. The date cvs. used were Khudary, Sufri, and Serri; and the date-water conc. were 20, 30, 40, 50, 60 and 70°Brix. The 20 and 30°Brix conc. exhibited Newtonian flow in the temp. range 25-85°C while the other conc. (40, 50, 60 and 70°Brix) were well described by the simple power law model in the temp. range 25-95°C and their flow was non-Newtonian exhibiting pseudoplastic behaviour. Temp. had a pronounced effect on consistency coeff. of samples at 40°Brix concn. from the 3 cvs. The magnitude of the consistency coeff. decreased with increase in temp. The Arrhenius model described the effect of temp. on the apparent viscosity with activation energies from 1.9×10^4 to 3.1×10^4 kJ kg^{-1} mol^{-1} at 50 s^{-1}, from 1.9×10^4 to 3.2×10^4 kJ kg^{-1} mol^{-1} at 100 s^{-1}, and from 1.9×10^4 to 3.3×10^4 kJ kg^{-1} mol^{-1} at 200 s^{-1}. The magnitude of activation energy increased with increase in concn. AA

Durian

904

Jaswir (I), Man (YBC), Yusof (S), Selamat (J) and Sugisawa (H). **Effect of glucose syrup solid, sucrose, hydrogenated palm oil and soy-lecithin on sensory acceptability of durian leather.** *Journal of Food Processing Preservation* 22(1); 1998; 13-25

A two-stage optimization of ingredients in durian leather formulations was conducted using Response Surface Methodology (RSM). In stage 1, the independent variables were glucose syrup solids (GSS) and sucrose, and in stage 2, the variables were hydrogenated palm oil (HPO) and soy-lecithin (SL). Based on the responses to sensory acceptability attributes including taste, aroma, texture, appearance and overall acceptability, the most acceptable formulation was a combination of 10% GSS, 5% sucrose, 2.67% HPO and 0.452% SL. Chemical analysis also showed that during processing nutrient composition was relatively unchanged. AA

Hazelnuts

905

Demirtas (C), Ayhan (T) and Kaygusuz (K). **Drying behaviour of hazelnuts.** *Journal of the Science of Food and Agriculture* 76(4); 1998; 559-564

A diffusion-based drying model has been used to model the single-layer drying of whole hazelnuts (hull, air-gap and kernel). The drying of whole hazelnut was simulated by means of the numerical sol. of Fick's second law for a composite solid consisting of an air gap which is between two solid bodies. The Crank-Nicholson implicit numerical method has been applied to solve the diffusion equation with variable mass diffusivity for whole hazelnut. The numerical data so obtained has been presented in the form of a series of curves which represent the drying characteristics of a whole hazelnut. Experimental results from whole hazelnuts were correlated with the theoretical results. A correlation describing the diffusivity of the whole hazelnut with moisture content and temp. was established, when the expression of diffusivity for hazelnut was used. Predicting the drying behaviour of the hazelnut for a known value of initial moisture content, equilibrium moisture and equivalent radius. a good agreement was obtained between the experimental data and prediction. Whole hazelnut diffusivity was determined at 25-45°C, air velocity 0.2-0.3 ms^{-1}, 60% RH of air, using the theoretical curves that best fit the data. The diffusivity of whole hazelnut was determined as a function of drying air temp. and velocity. AA

Litchies

906

Jiang (Y) and Fu (J). **Inhibition of polyphenol oxidase and the browning control of litchi fruit by glutathione and citric acid.** *Food Chemistry* 62(1); 1998; 49-52

Polyphenol oxidase (PPO, EC 1.10.3.2) from litchi peel was partially purified by ammonium sulphate fractionation and gel filtration, and a 16-fold purification of PPO achieved. The use of 10 mmol l^{-1} glutathione and 100 mmol l^{-1} citric acid was found to give good control of the browning of litchi fruit and 80-85% inhibition of PPO observed. Application of

glutathione in combination with citric acid is recommended as a way of slowing the browning of litchi fruit. AA

Mangoes

907

Bhattacharya (S) and Rastogi (NK). **Rheological properties of enzyme-treated mango pulp.** *Journal of Food Engineering* 36(3); 1998; 249-262

Mango pulp was treated with pectinase enzyme at different times (30-150 min) and temp. (25-60°C) of treatment, and at various concn. of enzyme (0.005-0.095%). The effect of these enzyme treatment conditions on the rheological parameters (yield stress, flow behaviour index and consistency index) and the apparent viscosity, were determined employing a second order central composite rotatable design in combination with response surface methodology. The raw, as well as the enzyme-treated, mango pulp behaved as pseudoplastic liquid and possessed yield stress. The Herschel-Bulkley model fits well (r greater than or equal to 0.991, P less than or equal to 0.01) the shear rate and shear stress data. An increase in time and/or concn. of enzyme treatment is associated with an increase in the flow behaviour index. Apparent viscosity markedly decreased with an elevation in the concn. of the enzyme. AA

Melons

908

Ayhan (Z), Chism (GW) and Richter (ER). **The shelf-life of minimally processed fresh cut melons.** *Journal of Food Quality* 21(1); 1998; 29-40

Honeydew and cantaloupe melons were surface sterilized by scrubbing with a hypochlorite sol. at low level (200 ppm total available chlorine) and high level (2000 ppm total available chlorine), peeled and cut into "chunks". Fruit pieces were dipped in a dilute hypochlorite sol. (pH 6) of 50 ppm total available chlorine prior to packaging under an atm. of 95% N_2 and 5% O_2 and storage at 2.2°C. Unwashed and water-washed samples were also prepared as controls. Microbial counts and sensory analyses were monitored during a 20 day storage period. Microbial counts of unwashed and water-washed samples were found to be significantly (P less than or equal to 0.05) different from the fruits which were chlorine washed initially, and during the storage time. However, increasing the free available chlorine concn. tenfold did not result in any further significant increase in the shelf-life. Rapid decline was observed in all measured microbial and sensory quality factors of unwashed samples during storage. Proper sanitation and production practices along with raw material selection can ensure a shelf-life of 15 days for cantaloupe and honeydew pieces. AA

Peaches

909

Fernandez-Trujillo (JP) and Artes (F). **Effect of intermittent warming and modified atmosphere packaging on colour development of peaches.** *Journal of Food Quality* 21(1); 1998; 53-69

Peaches (*Prunus persica* L. Batsch cv. 'Paraguayo') at firm-breaker stage of maturity were stored at 0.5°C for 3 wks. Intermittent warming (IW) for 1 day at 20°C every 6 days of cold storage at 0.5°C, modified atm. packaging (MAP) generated by 42 μm oriented polypropylene bags, and a combination of MAP and IW were applied. Changes in skin and flesh colour (measured by CIELAB parameters and Chroma and Hue angle colour indices) during normal postharvest ripening at 20°C, during cold storage and after 3 days of post-storage ripening were studied. For commercial purposes, IW led to the same colour level being reached as was found in normal postharvest ripened fruits. In contrast, the high CO_2 and low oxygen generated by MAP alone or combined with IW delayed colour development even during post-storage ripening. Ground colour measured by hue angle was the best index for monitoring colour evolution during ripening and storage. AA

Plums

910

Sharma (KD) and Lal (BB). **Effect of partial osmotic dehydration prior to canning on drained weight and quality of three varieties of plum.** *Journal of Food Science and Technology (India)* 36(2); 1999; 136-138

The fruits of three plum var. viz., 'Red Ace', 'Burbank-A' and 'Kanto-5' with or without the addition of Ca ions and osmotic treatment for varying periods of time were canned in 35°B sugar syrup. Cut-out analysis after one yr. of storage at ambient temp. (9-36°C) indicated that the osmotically treated

fruits in 70°B sugar sol. at 50°C for 1.0 h prior to canning resulted in desired drained wt. alongwith improved texture, colour and taste in comparison to the conventional method of canning. The fruits of 'Burbank-A' var. were adjudged best for different quality parameters. This treatment can successfully be applied for canning plum fruits on commercial scale, as the technique is simple and requires no extra investment for its application in a factory. AA

Pomegranates

911

Waskar (DP), Khedkar (RM) and Garande (VK). **Effect of post-harvest treatments on shelf life and quality of pomegranate in evaporative cool chamber and ambient conditions.** *Journal of Food Science and Technology (India)* 36(2); 1999: 114-117

Freshly harvested pomegranate var. 'Ganesh' were subjected to treatments of wax, wax coupled with carbendazim (0.1%), captan (0.2%), copper oxychloride (COC) (0.25%), mancozeb (0.2%). These fruits and untreated lot (as control) were kept at room temp. (22.2-24.4°C with 52.0 to 82.0% RH) and in cool chamber (16.14 to 18.22°C with 85 to 95% RH). Results indicated that fruits treated with wax coupled with carbendazim (0.1%) could be kept upto 48 days in cool chamber as against 30 days at room temp. Data on shelf-life, physiological loss in wt. (PLW), juice content, acidity and TSS indicated that the cool chamber might be an ideal on-farm storage facility for maintaining quality and market acceptability of pomegranate. AA

CONFECTIONERY, STARCH AND SUGAR

Confectionery

Chocolates

912

Lipp (M) and Anklam (E). **Review of cocoa butter and alternative fats for use in chocolate: Part B. Analytical approaches for identification and determination.** *Food Chemistry* 62(1); 1998; 99-108

This work reviews the literature on analytical methods suitable for the detection, identification and detn. of foreign fats in cocoa butter and chocolate. Most methods are based on chromatography, analysing either the fatty acids, triglyceride or the fractions of the unsaponifiables (sterols, triterpenes, etc.). None of the methods reviewed here allows the unequivocal quantification, or just the detection, of foreign fats in chocolate without any exemption for the kind of foreign fat added. The type of foreign fats which are not detectable depends strongly on the analytical techniques applied. It is proposed to combine a number of techniques with a chemometric approach to develop unique patterns allowing the unequivocal detection and quantification of foreign fats, without having prior knowledge regarding the kind of fat added. This approach is based on the use of a complex pattern of the constituents of cocoa butter and any deviation from this pattern is attributed to the existence of foreign fat. AA

913

Lipp (M) and Anklam (E). **Review of cocoa butter and alternative fats for use in chocolate: Part A. Compositional data.** *Food Chemistry* 62(1); 1998: 73-97

This work reviews the literature on the compositional data of vegetable fats used or proposed as alternatives to cocoa butter in chocolate and confectionery products. Cocoa butter is the only continuous phase in chocolate, thus responsible for the dispersion of all other constituents and for the physical behaviour of chocolate. Unique to cocoa butter is its brittleness at room temp. and its quick and complete melting at body temp. There were, and are, strong efforts to replace cocoa butter in part for chocolate production for technological and economic reasons. Such cocoa butter alternatives are the so-called cocoa butter equivalents (CBEs), cocoa butter substitutes (CBSs) and cocoa butter replacers (CBRs). These are mostly mixtures of various vegetable fats (often modified) and can consist of palm and palm kernel oil, illipe fat, shea butter, sal fat and kokum butter. In addition, a large var. of other vegetable oils can be used. Their composition according to triglycerides, fatty acids, sterols and other unsaponifiable components is discussed in this report. AA

914

Chapman (KW), Rosenberry (LC), Bandler (DK) and Boor (KJ). **Light-oxidized flavour development and vitamin A degradation in chocolate milk.** *Journal of Food Science* 63(5); 1998; 930-934

Samples of several chocolate milk formulations were exposed to light to determine if the components masked and/or prevented light-oxidized flavours or prevented photodegradation of vitamin A. Chocolate flavour added either before or after light exposure masked light-oxidized flavour ($P < 0.05$). Neither carrageenan nor chocolate colour prevented development of light-oxidized flavour. Vitamin A degradation was reduced by the addition of carrageenan alone or in combination with chocolate dairy powder (chocolate flavour and colour), chocolate colour or chocolate flavour ($P < 0.05$). AA

Starch

915

Xu (Z) and Raphaelides (SN). **Flow behaviour of concentrated starch dispersions using a tube rheometer of novel design.** *Journal of Texture Studies* 29(1); 1998; 1-13

A tube rheometer of novel design was used to study the flow properties of starch dispersions with concn. from 7 to 30% w/w at 95°C. The flow properties of maize starch dispersions were largely influenced by the time of cooking and shearing that elapsed before the measurements were taken. Viscosity gradually decreased with the time of shearing until it reached a min. value which then remained constant. Viscosity measurements, taken at 95°C and 75°C, of dispersions of 10 and 15% w/w starch concn. indicated that the activation energy of the flow was concn. dependent. The flow behaviour shown by the starch dispersions was attributed to the presence of the amylose matrix rather than to swollen granules. AA

BAKERY PRODUCTS

916

Zuckerman (H) and Miltz (J). **Temperature profiles in dough heated with a susceptor in the microwave oven.** *Journal of Food Processing Preservation* 22(1); 1998; 53-65

A model based on energy considerations for predicting temp. profiles in a microwaved dough placed in contact with a susceptor was developed. Using a commercial finite element software ("Ansys 5.01"), for an axisymmetric and transient heat transfer problem, the temp. at the dough/susceptor interface and in the whole dough were calculated The calculated temp. at the susceptor/dough interface were superimposed on previously published curves (based on a correlation relating temp. at the interface with heating time, dough and susceptor parameters) and compared to experimentally determined values. A very good agreement between the experimentally determined temp. and the values predicted from this model and from the previously described correlation was obtained. In the dough, an uneven temp. distribution in the radial direction, caused mainly by evaporative cooling at the surface, was predicted. The calculated temp. for different susceptors, heating times and various locations in the dough correlated well with experimentally determined values. AA

917

Rasanen (J), Blanshard (JMV), Mitchell (JR), Derbyshire (W) and Autio (K). **Properties of frozen wheat doughs at subzero temperatures.** *Journal of Cereal Science* 28(1); 1998; 1-14

The thermo-mechanical properties of frozen wheat doughs were investigated at different water contents and after different periods of frozen storage. Subzero properties of wheat doughs were measured by dynamic mechanical thermal analysis (DMTA) and dielectric thermal anlysis (DETA). Over the temp. range -90 to +40°C and by ^{1}H-nuclear magnetic resonance (NMR) T_2 relaxation over the range -45 to 0°C. The glass transitions of doughs measured by DMTA and DETA were related to the amount of liquid phase as determined by ultracentrifugation. GS

918

Watanabe (E), Bell (AE) and Brockway (BE). **The effect of protein disulphide isomerase on dough rheology assessed by fundamental and empirical testing.** *Food Chemistry* 61(4); 1998; 481-486

Fundamental rheological tests were carried out on wheat flour dough containing protein disulphide isomerase (PDI, E.C. 5.4.3.1.) and compared with their respective controls. The Controlled Stress Rheometer (CSR) and the Dynamic Mechanical Thermal Analyzer (DMTA) were used. Results from these instrumental tests which are essentially non-destructive were compared with results obtained when using a traditional Extensometer. The possibility of PDI duplicating the effect of

potassium bromate was evaluated. Fundamental testing provided more information about the structure of the dough when used under a wide range of different testing conditions. The Extensometer, under the conditions used in this work, was better than the CSR and the DMTA for showing the effect of PDI (50 ppm, flour basis), which seemed to make the dough more elastic the longer the resting time. Although the effect was basically the same as that produced by potassium bromate, it was not of the same magnitude. AA

919

Kettlewell (PS), Griffiths (MW), Hocking (TJ) and Wallington (DJ). **Dependence of wheat dough extensibility on flour sulphur and nitrogen concentrations and the influence of foliar-applied sulphur and nitrogen fertilizers.** *Journal of Cereal Science* 28(1); 1998; 15-23

Three field experiments on winter wheat from 1986 to 1988 tested the effect of late-season foliar-applied S and N fertilisers on baking quality. Only the experiment in 1988 produced grain with an S concn. and N:S ratio that could be classified as deficient by the accepted thresholds. Grain or flour S concn. was increased slightly in 1986 and 1988 by foliar-applied S. Dough resistance was reduced slightly by applied S in 1986, but this effect was dependent on cv. and whether foliar N was applied. There were no effects of the fertilisers on baking quality in 1987 or 1988. When data from all 3 experiments were combined and corrected for mean effects of yr. and cv., multiple regression showed that dough extensibility increased with both increasing flour S and N concn. This is the first report in the U.K. that dough extensibility is limited by flour S status of field-grown wheat, and these crops provide the earliest evidence in the U.K. of a relationship between a measure of baking quality and S status of flour. AA

Bread

920

Kieffer (R), Wieser (H), Henderson (MH) and Graveland (A). **Correlations of the breadmaking performance of wheat flour with rheological measurements on a micro-scale.** *Journal of Cereal Science* 27(1); 1998; 53-60

For the characterization of wheat quality, micro-extension tests for dough and gluten and a micro-baking test were developed using comparable dough compositions, the same mixing temp. and cv.-specific mixing times. By means of these methods, the flours of 26 wheat samples were studied for dough development time, max. resistance and extensibility of dough and gluten and loaf vol. of the baked products. Standard methods (rapid-mix-test, gluten index detn.) were used for comparison. The results indicated that the rheological properties of dough and gluten as well as the gluten index are correlated higher with the optimised micro-baking test than with the standard baking test. If flour protein or wet gluten content is included in the correlations, the extension test of gluten, which can be performed easily and reproducibly, allows a reliable prediction of the loaf vol. obtained by the micro-baking test. AA

921

Zehentbauer (G) and Grosch (W). **Crust aroma of baguettes: 1. Key odourants of baguettes prepared in two different ways.** *Journal of Cereal Science* 28(1); 1998; 81-92

The crusts of two white breads (French-type), differing in the flavour profiles owing to differences in both the amount of yeast and the dough-making process, were analysed by using instrumental and sensory methods. 2-Acetyl-1-pyrroline, 4-hydroxy-2,5-dimethyl-3(2H)-furanone, 2,3-butanedione, methional, (E)-2-nonenal, methylpropanal, and 2- and 3-methylbutanal were identified as key odorants of the baguette crusts. Quantitative measurements indicated that the more intense, roasty odour note of the baguette prepared with a higher amount of yeast was caused by a higher concn. of pyrroline. In contrast, the more intense malty note of the baguette prepared with pre-fermented dough was correlated with an increase in the malty smelling aldehydes methylpropanal, and 2- and 3-methylbutanal. AA

922

Wesley (IJ), Larsen (N), Osborne (BG) and Skerritt (JH). **Non-invasive monitoring of dough mixing by near infrared spectroscopy.** *Journal of Cereal Science* 27(1); 1998; 61-69

A novel, non-invasive method of monitoring dough development using a diode array near infrared spectrometer has been developed. The variation in two specific absorbance wavelengths in the second derivative spectrum (1160 nm and 1200 nm) as the dough is mixed is shown to follow the same trend as

mixer power consumption. Both absorbance features show a reduction in peak area as dough mixing progresses, reaching a min. at optimum dough development, and an increase as the dough mixing continues past peak mixer power consumption. Consistent results were obtained for un-yeasted and full formula doughs made from flours of different strengths using 3 different laboratory mixers of different mixing action (spiral, z-arm and pin). In the case of the z-arm and pin mixers, the NIR mixing curves predicted longer mixing times than the power consumption curves, and both methods differentiated between flours of different strength. The spiral mixer showed no statistical difference between the mixing times measured by each method, and further, there was no statistical difference between the mixing times for each flour when measured using either method. These differences may be due to mixer design or mixing intensity. The data presented shows the potential of the technique for providing information on the chemical processes that occur during dough development in relation to flour strength and mixing action and intensity. AA

923

Leuschner (RGK), O'Callaghan (MJA) and Arendt (EK). **Bacilli spoilage in part-baked and rebaked brown soda bread.** *Journal of Food Science* 63(5); 1998; 915-918

Brown soda bread had a pH of 7-9 depending on the sodium bicarbonate concn. Part-baked bread developed ropiness after two days at room temp. *Bacillus subtilis*, *B. pumilus* and *B. licheniformis* were isolated and their spores displayed D-values in bread dough of 14, 10 and 56 min at 100°C. Germination and growth was examined in broth at pH 6-10 and at 4°, 20°, 30° and 37°C. No growth was observed at 4°C and at pH 10. Rebaking of the part-baked bread heat activated particularly *B. licheniformis* spores. AA

924

Koike (N), Lorenz (K) and Bechtel (PJ). **Steamed breads made from Colorado grown white wheats.** *Journal of Food Processing Preservation* 22(1); 1998; 41-52

925

Toufeili (I), Chammas (H) and Shadarevian (S). **Identification of key textural attributes of Arabic bread and their application to the assessment of storage and quality.** *Journal of Texture Studies* 29(1); 1998; 57-66

Regression analysis of magnitude estimates of 9 manual attributes was utilized to identify the key textural traits of Arabic bread. Twelve samples of Arabic bread were sensorily evaluated for selected textural attributes as perceived by consumers prior to purchasing and during preparation of bread for consumption. The best triplet, av. coeff. of detn. (R^2) of 0.901, for predicting the other textural attributes comprised the force required to initiate tearing, the degree to which the sample extends before rupturing and the pliability of samples. The magnitude of these attributes decreased significantly ($P < 0.05$) upon storage and exhibited marked variations with differences in quality of Arabic bread. Pliability, resistance to tearing and the degree to which the sample extends before rupturing are adequate for following the rate of staling and for ascertaining differences in quality in this class of baked products. AA

MILK AND DAIRY PRODUCTS

Milk

926

Lima (JLFC), Delerue-Matos (C) and Vaz (MCVF). **Automation of iron and copper determination in milks using FIA systems and colourimetric detection.** *Food Chemistry* 62(1); 1998; 117-121

This paper describes a flow injection manifold with a colourimetric detection system that enables the detn. of Fe and Cu in different types of milks, namely cow milk and infant formula powdered milks. The methodology used is based on the formation of coloured complexes produced by the reaction of Fe (II) with 1,10-phenanthroline and Cu(II) with 1,5-diphenylcarbazide. The samples were digested with nitric and sulphuric conc. acids and inserted in the FIA system without additional treatment. The pH adjustment was carried out inside the manifold including the addition of the reagents needed to form the absorbing sp. The sampling rate of both sp. was never lower than 120 detn. h^{-1}. The results obtained were compared with those given by the reference methods and the relative deviation was < 5 and 4% for the detn. of Fe and Cu resp. The precision of the results evaluated by the relative standard deviation

(RSD%) was less than 0.5% for Fe and 2% for Cu detn. AA

927

Foster (LH), Chaplin (MF) and Sumar (S). **The effect of heat treatment on intrinsic and fortified selenium levels in cow's milk.** *Food Chemistry* 62(1); 1998; 21-25

The effects of 2 heat processing methods (pasteurisation and spray drying) routinely used in the processing of cow's milk and the production of infant formula powder on the Se content of liquid milk, milk fortified with sodium selenite and sodium selenate were studied. Pasteurisation reduced intrinsic Se and selenate levels by 7.9% and 6.2% at $P < 0.05$ level and selenite levels by 7.0% at $P > 0.05$ level. Se losses following spray drying were 44.8% ($P < 0.001$), 11.4% ($P < 0.01$) and 10.0% ($P < 0.01$) for intrinsic Se, selenite and selenate fortified milk, resp. Total Se losses from unprocessed milk following processing (pasteurisation and spray drying) were 49.2% ($P < 0.001$), 17.6% (P) and 15.6% ($P < 0.001$) for intrinsic Se, selenite and selenate fortified milk, resp. AA

928

Arora (S) and Rai (T). **Storage stability of goat milk fat fractions.** *Journal of Food Science and Technology (India)* 36(2); 1999; 155-156

The lower melting fractions L_{24} and L_{28} showed significantly higher autooxidation rates as compared to control milk fat, S_{24} and S_{28} fractions. The development of peroxides and formation of secondary product carbonyls was highest in liquid milk fat than in whole milk fat and high melting fractions. Antioxidant (BHA) delayed the autooxidation of goat milk fat fractions and control milk fat. AA

929

Niven (GW), Knight (DJ) and Mulholland (F). **Changes in the concentrations of free amino acids in milk during growth of *Lactococcus lactis* indicate biphasic nitrogen metabolism.** *Journal of Dairy Research* 65(1); 1998; 101-107

Milk products

930

Garrote (GL), Abraham (AG) and Antoni (GLD). **Characteristics of kefir prepared with different grain:milk ratios.** *Journal of Dairy Research* 65(1); 1998; 149-154

Kefir is a traditional fermented milk beverage produced from kefir grains. The effects of changes in the kefir grain:milk ratio (quantity of kefir grains inoculated into the milk) on microflora composition, acidity, apparent viscosity and CO_2 content of fermented milk, were evaluated. Fermented milks obtained with different kefir grain:milk ratios had large differences in final pH, lactococci concn., apparent viscosity and CO_2 content. Results suggest a ratio of 10 g/l for a viscous and not very acid product. A ratio of 10 g/l gave an acid beverage with low viscosity and more effervescent taste. GS

Cheese

931

Shumaker (EK) and Wendorff (WL). **Factors affecting pink discoloration in annatto-coloured pasteurized process cheese.** *Journal of Food Science* 63(5); 1998; 828-831

Pink discoloration of annatto-coloured pasteurized process cheese was affected by cooking temp., type and concn. of emulsifying salts, amount of coloured cheese in process cheese blends, and the type of annatto colourant. Annatto emulsions showed the greatest tendency for pinking during prolonged heating while suspensions exhibited the greatest stability when heated. Increased cooking temp. resulted in slight decrease in Hunter a and b values, and overall decreases in hue angles. Emulsifying salt blends with increased amounts of sodium citrate resulted in decreased hue angles. Process cheeses (PC) made with more than 25% coloured cheese showed lower hue angles. Whey powder as a source of added solids in PC food promoted discoloration, with acid whey resulting in the most pinking. SRA

932

Gomes (AMP), Vieira (MM) and Malcata (FX). **Survival of probiotic microbial strains in a cheese matrix during ripening: Simulation of rates of salt diffusion and microorganism**

survival. *Journal of Food Engineering* 36(3); 1998; 281-301

The growth and survival behaviours of *Bifidobacterium lactis* and *Lactobacillus acidophilus* in a semi-hard Gouda cheese at various axial locations during 9 wk. of ripening at 13°C were assessed using non-linear regression analysis. The final av. salt levels ranged in 2-4% (w/w). Viable numbers of both probiotic strains underwent a slow decline during the first 3 wk. followed by a sharper decrease towards the end of ripening; such decrease was more substantial for the outer than for the inner cheese portions. Salt transport was successfully described by Fick's second law of diffusion, and the cheese was considered as a finite slab for modelling purposes. Salt diffusivity remained constant with item and was estimated to be 0.2 cm^2/day. Theoretical salt concn. profiles were in good agreement with experimental data. The mathematical models postulated and fitted to the microbial viability data encompassed both a linear relationship between specific death rate and salt concn. and a constant death rate, following a methodology of increasing model complexity. Decision on the better model was taken based on a F-test of the ratio of incremental sum of squares of residuals to sum of squares of residuals of the more complex model, and it was concluded that viability of the probiotic strains was better described by a first order process independent of local salt concn. Prediction of profiles of viable numbers of *B. lactis* and *L. acidophilus* in cheese with respect to both ripening time and axial location for several overall salt concn. is useful in attempts to predict potential viability by the time of consumption. AA

933

Barrios (MJ), Medina (LM), Lopez (MC) and Jordano (R). **Fungal biota isolated from Spanish cheeses.** *Journal of Food Safety* 18(2); 1998; 151-157

934

Wang (Y-C), Muthukumarappan (KAMM) and Gunasekaran (S). **A device for evaluating melt/flow characteristics of cheeses.** *Journal of Texture Studies* 29(1); 1998; 43-55

A device to objectively measure the melt/flow behaviour of cheeses at different temp. was built consisting of a temp.-controlled heater, an LVDT (linear variable differential transformer), and a personal computer with a data acquisition system. This device, named UW Meltmeter, operates in the lubricated squeeze-flow configuration and can be used either alone at a constant force or in conjunction with a universal testing machine at a constant deformation rate. A marker technique was used to verify the shear-free squeezing flow assumption. The flow of Mozzarella cheeses with 14 and 43% fat content was studied at 40 and 60°C under constant force (0.7 and 0.9 N) and constant cross-head speed (0.5 and 2.5 cm/min). Biaxial extensional strain rate and biaxial stress growth coeff. were calculated. The results supported the expected trend of increased meltability at higher fat levels and at higher temp. AA

Cheddar cheese

935

Khamrui (K) and Goyal (GK). **Microbial changes in cheddar cheese ripened in flexible plastic film.** *Journal of Food Science and Technology (India)* 36(2); 1999; 147-148

Cheddar cheese was manufactured using standard technique with slight modification for accelerated ripening. Blocks of green cheese were packed in vacuum in plastic film (P_1), packed in plastic film and shrink wrapped (P_2) (dipped in hot water 88°C/5 sec) and paraffined conventionally (control) (C) and then ripened at 10 plus or minus 2°C, 80 plus or minus 5% RH up to 3 months. At the end of the ripening period, standard plate counts and yeast and mould counts were lowest in P_2, followed by P_1 and C, resp. Anaerobic spore counts were lowest in C, followed by P_2 and P_1 resp. AA

Cheese whey

936

Onwulata (CI), Konstance (RP), Smith (PW) and Holsinger (VH). **Physical properties of extruded products as affected by cheese whey.** *Journal of Food Science* 63(5); 1998; 814-818

Corn, rice and potato flour were extruded with sweet whey solids (25 or 50%) and whey protein conc. (WPC) using low and high shear extrusion processing conditions. WPC added at product content of 25% had minimal effect on the texture of extruded products (EP). The moisture content of the EPS varied ($P < 0.05$) with type of shear, except for rice at low shear conditions. Higher shear resulted in higher moisture loss, and increase in melt temp.

from 120 to 128°C. Sweet whey solids reduced post extrusion product moisture. Product quality characteristics were directly related to the whey product content. Adequate control of moisture and standardization of product will improve extrusion processing of cheese whey products. SRA

Emmental cheese

937
Gagnaire (V), Lortal (S) and Leonil (J). **Free active peptidases are detected in Emmental juice extracted before ripening in the warm room.** *Journal of Dairy Research* 65(1); 1998; 119-128

Mozzarella cheese

938
Mauriello (G), Moschetti (G), Blaitta (G), Villani (F) and Coppola (S). **Proteolytic activity of lactococcal strains from water-buffalo Mozzarella starter cultures.** *Journal of Dairy Research* 65(1); 1998; 109-118

Growth and proteolytic activity of *Lactococcus lactis* strains were investigated in milks subjected to different heat treatments. Only 13.7% of the strains were of proteolytic phenotype. Proteinase-positive (Prt^+) strains exhibited a proteolytic activity that increased when the level of heat treatment was reduced and grew to a higher level than proteinase-negative (Prt^-) strains in low-heat-treated milk. When grown in autoclaved reconstituted skim milk, both Prt^- and Prt^+ strains had the same specific growth rate. Total DNA from four Prt^+ and eleven Prt^- strains was extracted and used for polymerase chain reaction amplification of fragments belonging to genes encoding for cell wall proteinase. Specific amplification products were displayed by all the Prt^+ strains, and by the Prt^- strain *L. lactis* subsp. *lactis* NWC 125. Reverse transcriptase-polymerase chain reaction was performed to detect the transcript of the proteinase genes. In addition to the Prt^+ strains, the experiment also detected the specific transcript in *L. lactis* subsp. *lactis* NWC 125, suggesting that other structural or functional deficiencies occurred in this strain. AA

Sour cream

939
Adapa (S) and Schmidt (KA). **Physical properties of low-fat sour cream containing exopolysaccharide producing lactic acid.** *Journal of Food Science* 63(5); 1998; 901-903

Syneresis, colour, apparent viscosity, and texture of three treatments of low-fat (6%) sour cream were compared. Samples were made using SC 801 (commercial sour cream culture with 3 µm exopolysaccharide capsule) alone, or + S-3 (*Streptococcus thermophilus* with 2 µm capsule) at 75:25 (v/v), or + S-4 (*Streptococcus thermophilus* with no capsule) at 75:25 (v/v). Treatments S-4 and S-3 resulted in higher syneresis. No differences were found among colour 'L', 'a' and 'b' values but s-3 had higher viscosity than S-4. No differences in cohesiveness occurred but SC 801 had higher adhesiveness than did S-4. SC 801 had the highest gumminess and S-4 the lowest. AA

Wheys

940
Ochirkhuyag (B), Chobert (J-M), Dalgalarrondo (M), Choiset (Y) and Haertle (T). **Characterization of whey proteins from Mongolian yak, khainak and bactrian camel.** *Journal of Food Biochemistry* 22(2); 1998; 105-124

Whey powder

941
Lamiot (E), Pouliot (M), Lebeuf (Y) and Paquin (P). **Hydration of whey powders as determined by different methods.** *Journal of Food Science* 63(5); 1998; 789-792

Four methods for evaluating water hydration of 15 whey derivative powders were compared, and results are discussed with respect to the chemical composition of the powders. Hydration capacities between 0.21 and 4.64 mL water/g of powder were obtained, depending on the method used. The filtration/centrifugation method gave the highest hydration capacity, whereas the paste-water retention method gave the lowest. The Baumann test and the paste-water retention method were well correlated with protein and lactose content of the powders, enabling differentiation between hydration

capacities of whey protein conc. (35% proteins) and electrodialyzed whey powders (12% proteins). Reliable characterization of hydration required a combination of methods. AA

Whey proteins

942

Lent (LE), Vanasupa (LS) and Tong (PS). **Whey protein edible film structures determined by atomic force microscope.** *Journal of Food Science* 63(5); 1998; 824-827

Atomic force microscopy was used to study edible films produced from whey proteins. The films were imaged under ambient conditions with no special sample preparation. Low resolution imaging of areas from 10 μm to 150 μm on a side was performed in the contact mode. Higher resolution scans of 350 nm to 2,700 nm required use of the noncontact imaging mode. Features about the same size as the primary protein in whey, β-lactoglobulin (7 nm), were identified in the film samples. Mol. aggregates in the range of 1 μm, reported in other studies using transmission electron microscopy of whey protein gels, were combined in results from atomic force microscopy. AA

943

Moreau (DL) and Rosenberg (M). **Porosity of whey protein-based microcapsules containing anhydrous milkfat measured by gas displacement pycnometry.** *Journal of Food Science* 63(5); 1998: 819-823

Porosity characteristics of spray-dried microcapsules consisting of whey proteins and anhydrous milkfat were investigated by gas displacement technique, using helium and nitrogen as displacing gases. Microcapsules exhibited mol.-sieve type porosity. True and apparent densities as well as porosity characteristics were affected by wall solids concn. and by core load. Results indicated that about 10% of capsule vol. was not accessible to helium. Pore vol. inaccessible to nitrogen penetration was affected by core load and solid concn. Results suggested that porosity, and hence gas-permeation into microcapsules, could be tailored by adjusting microcapsules composition. AA

Yoghurts

944

Ozer (BH), Bell (AE), Grandison (AS) and Robinson (RK). **Rheological properties of concentrated yoghurt (labneh).** *Journal of Texture Studies* 29(1): 1998; 67-79

The effect of 6 techniques for the elevation of the total solids on the rheological properties of labneh were investigated using controlled-stress dynamic rheometer. All samples exhibited a weak viscoelastic gel structure with the storage modulus (G') higher than the loss modulus (G") over all of the measured range. None of the experimental materials produced the same overall gel strength as the control made by draining with traditional cloth-bags. The changes in the storage modulus (G') as a function of amplitude sweep were mirrored by changes in the loss modulus (G"). Considerable differences in the loss tangent (G"/G') values of the various materials were observed at higher stress amplitudes. Rheological differences in the overall gel strength at low amplitude and frequency suggest that, although the type of protein interactions in each case may be similar, there are differences in the degree of interactions. Subsequent breakdown at higher amplitudes and frequencies suggests that the have been reduced, and that different methods of manufacture may be producing materials that have different space occupancy in the gel. AA

945

Perdigon (G), Valdez (JC) and Rachid (M). **Antitumour activity of yoghurt: Study of possible immune mechanisms.** *Journal of Dairy Research* 65(1); 1998; 129-138

The possible anticarcinogenic activity exerted by yoghurt and the variations induced by this fermented product on the different lymphoid cells associated with the gut during the induction of an intestinal tumour with 1,2-dimethylhydrozine (DMH) were explored. When the carcinogen was administered the inflammating immune response increased; yoghurt reduces this through the immunomodulator activity. GS

946

Mandal (PK), Rao (VK), Kowale (BN) and Pal (UK). **Utilization of slaughter house blood in human food.** *Journal of Food Science and Technology (India)* 36(2); 1999; 91-105

Blood accounts for about 3-5% of animals live wt. Whole blood contains about 18-19% protein similar to that found in lean meat. The protein contents of plasma and red blood cells (RBC) are 7-8% and 34-38%, resp. Blood is the first by-product obtained, while processing animal for meat. Blood should be collected in hygienic way for food use with or without anticoagulants. For convenience, serum should be separated from RBC with the help of cream separator and be preserved under refrigeration. From serum and RBC, protein isolates have been prepared separately by spray drying, freeze drying, solvent precipitation or by chromatographic techniques. For the preparation of globin protein isolates (GPI), decolorization is one of the important steps. All these protein isolates have got excellent functional properties and nutritive value, which make them suitable for use in meat and bakery products. Moreover, they can replace the use of chicken egg to some extent in food products without affecting acceptability. An attempt has been made in this review to illustrate the utilization of slaughter house blood in human food products such as meat sausages hamburgar, patties and bakery products. AA

Meat

947

Koohmaraie (M), Shackelford (SD) and Wheeler (TL). **Effect of prerigor freezing and postrigor calcium chloride injection on the tenderness of *Callipyge longissimus*.** *Journal of Animal Science* 76(5); 1998; 1427-1432

948

Hartmann (S), Lacorn (M) and Steinhart (H). **Natural occurrence of steroid hormones in food.** *Food Chemistry* 62(1); 1998; 7-20

949

Hsu (SY) and Chung (H-Y). **Effects of processing factors on qualities of emulsified meatball.** *Journal of Food Engineering* 36(3); 1998; 337-347

A four-factor central composite design was adopted for studying the effects of fat, salt, sugar and cooking temp. on qualities of an emulsified meatball or Chinese meatball. Results indicated that texture is the most important characteristic of this type of meat product. Consumers prefer a harder texture. Panel preferences significantly increased with the amount of salt added and significantly decreased with the amount of fat added in the process. Higher salt addition caused more salt-soluble protein to be extracted from the muscle cells to form a more stable meat emulsion, which resulted in lower cooking loss and made the final product harder and, therefore, obtained higher preference scores from the panels. Higher fat addition produced lighter products, but product colour has a minor influence on acceptability. Interaction effects between most processing variables were insignificant, except for product odour. AA

Beef

950

Faustman (C), Chan (WKM), Schaefer (DM) and Havens (A). **Beef colour update: The role of vitamin E.** *Journal of Animal Science* 76(4); 1998; 1019-1026

951

Berry (BW). **Cooked colour in high pH beef patties as related to fat content and cooking from the frozen or thawed state.** *Journal of Food Science* 63(5); 1998; 797-800

952

Raccach (M). **Analyses and predictions of the deterioration of comminuted beef.** *Food Control* 9(5); 1998; 261-265

953

Delmore (LRG), Sofos (JN), Schmidt (GR) and Smith (GC). **Decontamination of inoculated beef with sequential spraying treatments.** *Journal of Food Science* 63(5); 1998; 890-893

Mutton

954

Mendiratta (SK), Lakshmanan (V) and Rao (VK). **Effect of post-mortem calcium chloride injection on tenderization of sheep meat.** *Journal of Food Science and Technology (India)* 36(2); 1999; 149-151

Different concn. of $CaCl_2$ (100 mM, 200 mM and 300 mM) were injected to hindleg cuts of sheep within 3-4 h of slaughter at 10% (w/w). Samples were cooked after keeping for 24 h at 4 plus or minus 1°C. There were significant ($P < 0.05$) decreases in pH, increase in moisture content and water holding capacity (WHC) of raw meat after 24 h of treatment. However, no significant effect of the treatment was found in case of total plate counts, psychrophillic counts, collagen and ash contents. Analysis of cooked meat revealed no significant variations in WHC, moisture, ash, collagen solubility and cooked out juice, but there were significant ($P < 0.05$) decreases in pH, cooking loss and shear force values of $CaCl_2$ treated samples. Organoleptically, there were no significant differences in colour, flavour and juiciness scores. However, tenderness and overall acceptability scores were higher for $CaCl_2$-treated samples. The study indicated that use of $CaCl_2$ has great potential to improve tenderness of sheep meat. AA

955

Saha (U), Murthy (TRK) and Kowale (BN). **Effect of EDTA and ascorbic acid dip treatment on storage stability of goat meat at refrigeration temperature.** *Journal of Food Science and Technology (India)* 36(2); 1999; 180-183

Fresh goat meat chunks were dipped for 1 min in 1% (w/v) EDTA (pH 5.8-6.0), 1% EDTA + 1% ascorbic acid (pH 3.8-4.0) or 1% EDTA + 2% sorbitol (pH 6.0), drained and refrigerated. The EDTA + ascorbic acid (E+A) treated chunks showed significantly lower microbial counts and higher colour scores compared to EDTA alone or in combination with sorbitol. The rise in temp. of the E+A dip sol. to 50°C, showed significantly lower psychrotrophic, presumptive *Pseudomonas* and *Lactobacilli* counts as compared to those at ambient temp. (25-30°C). The E+A treatment reduced coliform, *Enterobacteriaceae* and *Staphylococcal* counts. The TBA values were significantly lower than those for control. The colour and microbial safety of refrigerated (E+A) treated samples increased by 5 days over the control. AA

Pork

956

Zhu (LG) and Brewer (MS). **Discoloration of fresh pork as related to muscle and display conditions.** *Journal of Food Science* 63(5); 1998; 763-767

957

Milligan (SD), Ramsey (CB), Miller (MF), Kaster (CS) and Thompson (LD). **Resting of pigs and hot-fat trimming and accelerated chilling of carcasses to improve pork quality.** *Journal of Animal Science* 76(1); 1998; 74-86

958

Wong (E), Linton (RH) and Gerrard (DE). **Reduction of *Escherichia coli* and *Salmonella senftenberg* on pork skin and pork muscle using ultraviolet light.** *Food Microbiology* 15(4); 1998; 415-423

959

D'Souza (DN), Warner (RD), Leury (BJ) and Dunshea (FR). **The effect of dietary magnesium aspartate supplementation on pork quality.** *Journal of Animal Science* 76(1); 1998: 104-109

Products

Bologna

960

Chin (KB), Keeton (JT), Longnecker (MT) and Lamkey (JW). **Low-fat bologna in a model system with varying types and levels of Konjac blends.** *Journal of Food Science* 63(5); 1998; 808-813

961

Chin (KB), Keeton (JT), Longnecker (MT) and Lamkey (JW). **Functional, textural and microstructural properties of low-fat bologna (model system) with a Konjac blend.** *Journal of Food Science* 63(5); 1998; 801-807

Sausages

962

Eklov (T), Johansson (G), Winquist (F) and Lundstrom (I). **Monitoring sausage fermentation using an electronic nose.** *Journal of the Science of Food and Agriculture* 76(4); 1998; 525-532

In this study a sensor array and pattern recognition routines (an electronic nose) were used to monitor a sausage fermentation in order to follow the changes in emitted volatile compounds during the fermentation process and to compare the electronic nose results with a sensory analysis. From the sensor array responses the fermentation time could be predicted using different methods, where principal component regression and an artificial neural network based on all sensors in the electronic nose performed best. A sensory panel evaluated the final product and these results were compared with the electronic nose measurements in the early stage of the process and on the final sausages. A principal component analysis showed that one of the sausage batches clearly deviated from the other using both the sensory panel data and the electronic nose responses. The deviating batch was different already after 4 h and the difference was consistent during the process. AA

963

Sanz (Y) and Toldra (F). **Aminopeptidases from *Lactobacillus sake* as affected by amines in dry sausages.** *Journal of Food Science* 63(5); 1998; 894-896

The effects of amines found in sausages (cadaverine, histamine, 2-phenylethylamine, putrescine, spermidine, spermine, tryptamine and tyramine) on the activity of four aminopeptidases (AP 1, AP 2, AP 3 and AP 4) from *Lactobacillus sake* were determined. Histamine caused the strongest inhibition on AP 1 followed by tryptamine. The activity of AP 2 was markedly reduced by tryptamine and 2-phenylethylamine. AP 3 was inhibited at similar levels by histamine, tyramine and tryptamine but activated by putrescine, cadaverine and spermidine. Agmatine caused the strongest inhibition on AP 4. AA

964

Eerola (HS), Sagues (AXR) and Hirvi (TK). **Biogenic amines in Finnish dry sausages.** *Journal of Food Safety* 18(2); 1998; 127-138

Poultry

965

Yuste (J), Mor-Mur (M), Capellas (M), Guamis (B) and Pla (R). **Microbiological quality of mechanically recovered poultry meat treated with high pressure and nisin.** *Food Microbiology* 15(4); 1998; 407-414

The combined effect of high hydrostatic pressure processing, addition of nisin and acidification on aerobic mesophilic and psychrotrophic bacterial populations of mechanically recovered poultry meat (MRPM) kept under refrigeration (2°C) was evaluated 1, 15 and 30 days after pressurization. Nisin (0, 12.5, 100 and 200 ppm) and glucono-δ-lactone (GdL; 0 and 1%) were added to MRPM. Vacuum-packaged samples were treated at 350 or 450 MPa and 2°C for 15 min using both continuous pressurization and three-cycle oscillatory pressurization for 5 min per cycle. In some samples a reduction of mesophile counts between 3.44 and 5.38 log cfu g^{-1} was found. Psychrotrophs seemed to be more sensitive; in samples with 100 ppm of nisin and GdL treated at 450 MPa with cycles they were reduced to undetectable levels (a lethality of approx. 7.5 log units). Cycle pressurization showed slightly better results than continuous pressurization. The combination of 350 MPa, 100 ppm of nisin and 1% of GdL was enough to extend the shelf-life of MRPM during the 30 day chilled storage. AA

966

Hao (YY), Brackett (RE) and Doyle (MP). **Efficacy of plant extracts in inhibiting *Aeromonas hydrophila* and *Listeria monocytogenes* in refrigerated cooked poultry.** *Food Microbiology* 15(4); 1998; 367-378

Alcohol extracts of angelica root, banana puree, bay, caraway seed, carrot, clove (Eugenol), marjoram, pimento leaf and thyme were applied to cooked chicken to determine their antimicrobial activities against *Aeromonas hydrophila* and *Listeria monocytogenes*. Skinless chicken breast meat was cooked to an internal temp. of 85°C, allowed to cool to c. 5°C, then treated by surface application with plant extracts. Low (10 cfu g^{-1}) or high (10^5 cfu g^{-1}) populations of *A. hydrophila* and *L. monocytogenes* were applied and samples were stored at either 5 or 15°C for up to 14 or 7 days, resp. Eugenol and pimento extracts were most effective in inhibiting

growth of both bacteria. *A. hydrophila* was the more sensitive to the 2 treatments, with 4 $\log_{10}$ cfu g^{-1} less growth occurring at 14 days at 5°C on eugenol-treated breast meat than on control samples. These results suggested that plant extracts might be useful as antimicrobials in cooked, ready-to-eat chicken meat. AA

967

Li (R), Carpenter (JA) and Cheney (R). **Sensory and instrumental properties of smoked sausage made with mechanically separated poultry (MSP) meat and wheat protein.** *Journal of Food Science* 63(5); 1998; 923-929

The effects of wheat protein on the texture properties of mechanically separated poultry (MSP) smoked sausages were investigated by a partial 3 3 3 factorial design (water, wheat protein and method of protein preparation) with two blocking factors (3 time periods and 9 panelists). The methods of wheat protein preparation did not influence any measurement. Sensory data indicated that added water affected hardness, springiness, and juiciness ($P < 0.05$) of samples, and added wheat protein affected hardness, cohesiveness of mass, juiciness, and wheat flavour ($P < 0.05$). Instrumental data showed that hardness, springiness and cohesiveness decreased with increasing water content ($P < 0.05$), and increasing wheat protein levels increased hardness and cohesiveness ($P < 0.05$). AA

Chickens

968

Boulianne (M) and King (AJ). **Meat colour and biochemical characteristics of unacceptable dark-coloured broiler chicken carcasses.** *Journal of Food Science* 63(5); 1998; 759-762

Spectrocolorimetry, pH, TBARS, total pigment and myoglobin were measured in normal and abnormally dark-coloured broiler chicken breast muscle. Analyses of L*, a* and b* values revealed that a* values were highly sensitive and specific to differentiate normal from dark-coloured carcasses and thus could be used as a potential diagnostic method for carcass classification at slaughter. Colour characteristics (L*, a* and b* values), pH, total pigment, myoglobin, and Fe concn. were all significantly different in dark-coloured muscle when compared with normal muscle. TBARS values and percentage moisture for the two groups were not different. AA

Products

969

Kwon (YM), Ha (SD) and Ricke (SC). **Growth response of a *Salmonella typhimurium* poultry isolate to propionic acid under aerobic and anaerobic conditions.** *Journal of Food Safety* 18(2); 1998; 139-149

In this study, *in vitro* growth response of *Salmonella typhimurium* isolated from poultry to propionic acid (PA) under aerobic and anaerobic conditions was determined. When grown in tryptic soy broth (TSB) containing buffered propionic acid (BPA), the growth rate of *S. typhimurium* gradually decreased as the level of BPA increased and broth pH decreased. No growth was detected with BPA concn. > 3% (v/v) of the broth. When the growth rates (GRs) of *S. typhimurium* in aerobic and anaerobic TSB were compared at 5.0 and 7.0 pH levels, the growth inhibition of *S. typhimurium* by PA was markedly suppressed by anaerobiosis at both pHs, as indicated by significantly ($P < 0.05$) higher half-inhibition constants. Also, the GRs of *S. typhimurium* in the presence of PA were dramatically reduced by the decrease in pH from 7.0 to 5.0. The growth inhibitory effect of PA against *S. typhimurium* strains was enhanced by pH decrease and suppressed by anaerobiosis, suggesting that the growth response of *S. typhimurium* to PA in the chicken intestine might be affected by the environmental conditions. SRA

Eggs

970

Chen (JY), Latshaw (JD), Lee (HO) and Min (DB). **α-Tocopherol content and oxidative stability of egg yolk as related to dietary α-tocopherol.** *Journal of Food Science* 63(5); 1998; 919-922

SEAFOODS

971

Lyver (A), Smith (JP), Tarte (I), Farber (JM) and Nattress (FM). **Challenge studies with *Listeria monocytogenes* in a value-added seafood**

product stored under modified atmospheres. *Food Microbiology* 15(4); 1998; 379-389

Challenge studies were carried out to evaluate the safety of value-added raw and cooked seafood nuggets (a_w 0.98, pH 7.0) inoculated with 10^3 cfu g^{-1} of *Listeria monocytogenes*. Nuggets were packaged in air, or 100% CO_2, with and without an Ageless SS oxygen absorbent and stored at 4 or 12°C. Headspace O_2 decreased to < 1% (v/v) in most packaged nuggets while headspace CO_2 ranged between 1 and 100% depending on packaging conditions and storage temp. Most products maintained acceptable appearance throughout storage, but nuggets stored at 12°C developed sharp, acidic odours by day 28. Product pH decreased from approx. pH 7.0 at day 1 to approx. pH 4.2-5.2 in raw nuggets, and 5.5-6.7 in cooked nuggets, depending on the storage temp. *Bacillus* spp. and lactic acid bacteria counts increased to 10^2 and 10^7 cfu g^{-1} resp. in raw nuggets, while only *Bacillus* spp. reached 10^4 cfu g^{-1} in cooked nuggets by 28 days. With the exception of nuggets packaged in 100% CO_2, with or without an absorbent, counts of *L. monocytogenes* increased to approx. 10^7 cfu g^{-1} in nuggets stored at both 4 and 12°C after 28 days. AA

Shrimps

972

Karthikeyan (M), Abraham (TJ), Indra Jasmine (G) and Jeyachandran (P). **Effect of post-harvest handling on the shelf-life of cultured shrimp (*Penaeus indicus*) in ice.** *Journal of Food Science and Technology (India)* 36(2); 1999; 177-179

The effect of post-harvest handling methods such as washing in seawater, chlorine disinfection, sodium metabisulphite dip, exposure to ambient temp. for 6 h and no washing on the shelf-life of cultured *Penaeus indicus* during storage in ice was studied on the basis of freshness evaluation and the rate of occurrence of black spots. Shelf-life of washed, chlorine-treated and metabisulphite-treated shrimps increased significantly over unwashed shrimps in ice. For every hour delay in icing, approx. 0.91, 1.18 and 1.80 days of shelf-life in ice were lost, when compared resp. with washed, chlorine-treated and metabisulphite-treated shrimps. AA

973

Karthikeyan (M), Abraham (TJ), Shanmugam (SA), Indra Jasmine (G) and Jeyachandran (P). **Effect of washing and chlorine disinfection on the quality and shelf-life of iced cultured shrimp.** *Journal of Food Science and Technology (India)* 36(2); 1999; 173-176

The biochemical, microbiological and sensory characteristics of cultured shrimp, *Penaeus indicus* as affected by washing and chlorine disinfection and subsequent storage in ice were studied. The levels of water soluble nitrogen, non-protein nitrogen, α-amino nitrogen and total volatile base-nitrogen reduced significantly ($P < 0.01$) in unwashed, seawater-washed and chlorine-treated shrimps with storage. The differences among the treatments were insignificant ($P < 0.05$). Washing and chlorine disinfection reduced the total plate counts and total and faecal coliform counts. Washing delayed the onset of black discolouration by a day. The freshness scores were negatively correlated ($P < 0.01$) with melanin scores of iced shrimp. The shelf life of unwashed, washed and chlorine-treated shrimp in ice was found to be 12.39, 16.43 and 18.21 days, resp. AA

974

Gundavarapu (S), Hung (Y-C) and Reynolds (AE). **Consumer acceptance and quality of microwave-cooked shrimp.** *Journal of Food Quality* 21(1); 1998; 71-84

The effect of different microwave treatments (240, 400, 560, 800 W for 140, 70, 52, 40 s; resp.) on consumer acceptance and correlation of sensory and instrumental quality measurements of microwave-cooked shrimp was investigated. All the microwave cooking treatments were acceptable (like moderately to like very much) by the consumers for all the attributes evaluated (colour, flavour, texture, juiciness and overall acceptability). However, shrimp cooked at 240 W for 140 s and with a 120 s holding before serving had better overall acceptability, flavour, and juiciness than shrimp cooked at high power (800 W). Nearly 80% of the consumers were willing to buy microwave cooked shrimp. Intensity ratings for hardness and juiciness obtained by descriptive analyses correlated well with the instrumental measurements. Hardness correlated with shear force ($R^2 = 0.92$) measured with a Warner-Bratzler blade and juiciness with a modified filter paper press method ($R^2 = 0.95$). AA

Fish

975

Grigg (NP), Daly (J) and Stewart (M). **The use of statistical process control in fish product packaging.** *Food Control* 9(5); 1998; 289-297

This paper presents a case study which demonstrates that simple, manual statistical process control systems (SPCS) involve very little statistical knowledge to establish and operate. SPCS can reduce unnecessary check weigher rejections and product giveaway, assist with trading standards inspections and improve customer confidence. SRA

Catfish

976

Wu (W-H) and Lillard (DA). **Cholesterol and proximate composition of channel catfish (*Ictalurus punctatus*) fillets-changes following cooking by microwave heating, deep-fat frying, and oven baking.** *Journal of Food Quality* 21(1); 1998; 41-51

Effects of microwave heating, deep-fat frying, and conventional oven baking on proximate composition and concn. of cholesterol in channel catfish fillets were examined. The paired fillet technique was employed to control the variability among fish. A total of 15 catfish were randomly assigned to the 3 cooking methods. All cooking procedures resulted in moisture loss. Fillets that were deep-fat fried showed the lowest moisture content but the highest fat content, resp., among 3 cooking methods. The 3 cooking methods, on a dry wt. basis, all significantly affected cholesterol concn. of cooked catfish compared with raw fillets. Deep-fat frying resulted in a significant decrease of cholesterol and showed the lowest concn. of cholesterol among 3 cooking methods probably due to leaching of cholesterol into frying oil. AA

977

Chew (S-Y) and Hsieh (Y-HP). **Rapid CO_2 evolution method for determining shelf-life of refrigerated catfish.** *Journal of Food Science* 63(5); 1998; 768-771

The feasibility of a CO_2 evolution method using an IR analyzer to evaluate the shelf-life of refrigerated (4°C) catfish was investigated. Aerobic plate count (APC), and isoelectric focusing (IEF) of samples were compared with the CO_2 evolution rate (CER) detn. The increases in CER (25.78 to 195.63 $\mu Lg^{-1}h^{-1}$) for farm raised catfish stored from 0 to 10 days correlated highly with APCs (4.32 to 10.24 log CFU g^{-1}). The IEF data also confirmed the APC and CER results. Catfish spoilage was evident after 6 days at 4°C. Direct measurement of CER is a rapid and effective method to determine the microbial quality of catfish. AA

Hakes

978

Barroso (M), Careche (M), Barrics (L) and Borderias (J). **Frozen hake fillets quality as related to texture and viscosity by mechanical methods.** *Journal of Food Science* 63(5); 1998; 793-796

Raw and cooked fillets were analyzed for texture using Kramer and Warner-Bratzler shear cells and a puncture device. Apparent viscosity, dimethylamine and protein solubility were also measured. Principal component analysis indicated 3 factors accounting for 86.5% of the variance. Four clusters were found, ranging from excellent quality (low texture, high viscosity) to very poor (high texture, low viscosity). SRA

Mackerels

979

Jiang (S-T), Ho (M-L), Jiang (S-H) and Chen (H-C). **Purified NADPH-sulphite reductase from *Saccharomyces cerevisiae* effects on quality of ozonated mackerel surimi.** *Journal of Food Science* 63(5); 1998; 777-781

The NADPH-sulphite reductase from *Saccharomyces cerevisiae* was purified to electrophoretic homogeneity by ammonium sulphate fractionation, DEAE Sephacel, Sephacryl S-300 and DEAE Sephadex A-50 chromatography. Optimal pH was 7.3 and temp. 25°C. It was inhibited by IAA, PCMPS, PMSF, NEM, PCMB, cyanide and most divalent metal ions. For the ozonated mackerel surimi ground with purified reductase, the reactive SH increased from 2.29×10^{-5} to 4.46×10^{-5} mole/g and gel strength from 256.7 to 360.5 g.cm. According to SDS-PAGE, the recovery of myosin heavy chain was observed on the ozonated mackerel surimi with addition of NADPH-sulphite reductase. AA

Scallop

980
Wongso (S) and Yamanaka (H). **Extractive components of the adductor muscle of Japanese baking scallop and changes during refrigerated storage.** *Journal of Food Science* 63(5); 1998; 772-776

Shark

981
Chou (S-S), Su (S-C), Shiau (H-W), Hwang (D-F), Yu (P-C), Lee (S-C). **Protein and amino acid profiles in natural and artificial shark fins using capillary electrophoresis.** *Journal of Food Science* 63(5); 1998; 782-784

The potential utility of capillary electrophoresis (CE) for differentiation between natural and artificial shark fins was established. Three major protein components (peaks I-III) of shark fins were well-separated and used as parameters for differentiation between natural and artificial shark fins. The height ratio of protein peak III to protein peak I was higher in natural shark fins than that in artificial products. Further, the profile of amino acids in natural dried shark fins was somewhat different from that in artificial samples. The level of tyrosine was especially high (5.11-8.11%) in natural dried shark fins, but low or not detectable (0-0.22%) in artificial samples. AA

Tuna

982
Zhao (Y), Kolbe (E) and Craven (C). **Computer simulation of onboard chilling and freezing of albacore tuna.** *Journal of Food Science* 63(5); 1998; 751-755

The PDEase computer program package could be used to accurately simulate onboard chilling and freezing of albacore tuna. The program has capabilities of modification, expansion, interfacing and varying temp. dependent thermophysical properties and nonuniform boundary conditions. Results could describe important operational strategies, such as detn. of appropriate freezing media velocity, pre-chilling or landing rate of fish. This program could be applied to simulate the chilling and freezing of other fish. SRA

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

983
Keukeleire (DD). **Automated reporting on the quality of hops and hop products.** *Journal of the Institute of Brewing* 104(2); 1998; 75-82

The quality of a hop var. or a hop product can readily be assessed by a fully automated sequence of selective extraction, fractionation and quantitative analysis. To illustrate the elegance of the method, nine hop var. and three hop extracts were compared with respect to the content of important marker compounds in the hop oils and of the hop acids. Supercritical fluid extraction at different densities of CO_2 was applied to extract selectively, the hop oils and the hop acids, resp. The hop oils were further fractionated into an apolar and a polar fraction by solid phase extraction and consecutive elution with n-hexane and ethyl acetate. Separation and identification were achieved by capillary GC coupled to MS. Myrcene, β-caryophyllene, α-humulene and β-farnesene in the apolar fraction, linalool, undecan-2-one, tridecan-2-one and humuladienone in the polar fraction were selected for quantitative evaluation of the respective hop oils. Sulphur-containing compounds were revealed by capillary GC using sulphur-selective atomic emission detection. Complete separation and quantification of all hop α-acids and β-acids was effected by microemulsion electrokinetic chromatography coupled to diode array detection. AA

Beer

984
Landaud (S), Lieben (P) and Picque (D). **Quantitative analysis of diacetyl, pentanedione and their precursors during beer fermentation by an accurate GC/MS method.** *Journal of the Institute of Brewing* 104(2); 1998; 93-99

A GC/MS method previously described for diacetyl was developed for the quantification of 2,3-pentanedione, and the derivatization procedure was modified for the detn. of α-acetohydroxy acid. The reaction of 2,3-pentanedione with 4,5-dichloro-1,2-diaminobenzene produced 6,7-dichloro-2-methyl-3-ethylquinoxaline (DCMEQ), which was extracted with toluene and determined by GC using a mass selective detector. The formation of DCMEQ was linearly correlated with the 2,3-pentanedione concn. The method was very simple and sensitive. The detection limit of the 2,3-pentanedione derivative and diacetyl derivative was 0.0007 mg/l and 0.0002 mg/l of the toluene extract resp., and the detn. limit was 0.001 mg/l and 0.0007 mg/l, resp. Cautious sample treatment led to a low (10%) and controlled conversion of α-acetohydroxy acids to vicinal diketones. This reproducible percentage of conversion made it possible to determine precisely free vicinal diketones and α-acetohydroxy acids. The method was applied to the detn. of precursors and vicinal diketones concn. during beer fermentation. AA

985

Cooper (DJ), Stewart (GG) and Bryce (JH). **Some reasons why high gravity brewing has a negative effect on head retention.** *Journal of the Institute of Brewing* 104(2); 1998; 83-87

The effect of high gravity brewing on head retention with respect particularly to the effect of high gravity brewing on hydrophobic polypeptide levels was examined. High gravity brewed beer had poorer head retention values when compared to a similarly brewed low gravity beer. Analysis of hydrophobic polypeptide levels in both high gravity wort (20° Plato) and low gravity wort (10° Plato) produced using a lauter tun, revealed that the high gravity wort contained 8% less hydrophobic polypeptide than the low gravity wort (undiluted basis). Analysis of hydrophobic polypeptides throughout the brewing process for these 10°P and 20°P brews demonstrated that the hydrophobic polypeptide content decreased, especially during the kettle boil and fermentation. Furthermore, the high gravity brewed beer suffered the greatest loss, leaving the final beer with approx. 40% less hydrophobic polypeptides than the low gravity beer. Brewing at 10°P and 20°P using a mash filter demonstrated that these filters can improve the head formation and stability of the resultant beers at sales gravity. However, the low gravity beer still produced a more stable foam (Rudin value 93 s) when compared to the high gravity beer (Rudin value 83 s). The mash filter slightly increased the hydrophobic polypeptide extraction. It is concluded that the mash filter produced higher hydrophobic polypeptide levels in the final beers, as well as having a positive effect on reducing the levels of foam negative compounds such as fatty acids in the wort, and therefore slightly improved head retention values. AA

986

Dupire (S). **Determination of total vicinal diketones in beer by headspace capillary gas chromatography.** *Journal of the Institute of Brewing* 104(2); 1998; 67-68

Wines

987

Sohier (D) and Lonvaud-Funel (A). **Rapid and sensitive *in situ* hybridization method for detecting and identifying lactic acid bacteria in wine.** *Food Microbiology* 15(4); 1998; 391-397

A rapid and sensitive *in situ* hybridization method, using total genomic DNA probes, can specifically detect and identify the lactic acid bacteria (LAB) in wine. The total genomic DNA probes were labelled with digoxygenin (DIG) by random priming and hybridized with the genomic DNA of the bacteria to be identified. The hybrids were detected with fluorescent anti-DIG Fab-fragments or with enzyme-conjugated anti-DIG Fab fragments. The cell wall of the Gram-positive LAB was made permeable with a lysozyme treatment to allow the accessibility of the probe to the target DNA and the penetration of anti-DIG antibodies which specifically bound to their antigens. The total genomic DNA probes exhibited the same specificity with dot-blot and *in situ* hybridization. The *in situ* hybridization technique made possible the control of the bacterial population in wine at different stages of vinification of storage, and the identification of LAB which can cause wine spoilage. AA

Non-alcoholic beverages

988

Laplace (J-M), Apery (S), Frere (J) and Auffray (Y). **Incidence of indigenous microbial flora from utensils and surrounding air in traditional French cider making.** *Journal of the Institute of Brewing* 104(2); 1998; 71-74

Coffee

989

Andrade (PB), Leitao (R), Seabra (RM), Oliveira (MB) and Ferreira (MA). **3,4-Dimethoxycinnamic acid levels as a tool for differentiation of *Coffea canephora* var. *robusta* and *Coffea arabica*.** *Food Chemistry* 61(4); 1998; 511-514

Thirteen green *Coffea canephora* var. *robusta* and 7 green *Coffea arabica* coffee beans from different geographical origins were analysed by HPLC/diode-array detector for hydroxycinnamic acids (HCAs) discrimination and quantification to assess the possible markers for their botanical and geographical origins. While the HCAs, p-coumaric, o-coumaric and 3,4-dimethoxycinnamic acids were detected in the majority of samples, caffeic and ferulic acids were present in all of them. Sinapic and 4-methoxycinnamic acids were found in only one sample from Mexico and Honduras, resp. In spite of the preliminary nature of this study, it seems that the relative amount of the HCAs could be related to the botanical origin of coffee. In fact, *Coffea canephora* var. *robusta* contains a higher level of 3,4-dimethoxycinnamic (X plus or minus SD:0.433 plus or minus 0.15, ranging from 0.237 to 0.691 g kg^{-1}) than the *Coffea arabica* samples (X plus or minus SD:0.059 plus or minus 0.03, ranging from 0.016 to 0.095 g kg^{-1}). AA

Fruit juices

990

Ng (L-K) and Hupe (M). **Analysis of sterols: A novel approach for detecting juices of pineapple, passionfruit, orange and grape fruit in compounded beverages.** *Journal of the Science of Food and Agriculture* 76(4); 1998; 617-627

Direct GC/MS analysis of the hexane extracts of fruit juices provides an efficient means for demonstrating that very different sterol patterns exist in the juices of pineapple, passionfruit and the 2 citrus fruits, orange and grapefruit. Ergostanol and stigmastanol were found to be the sterol markers for pineapple juice, while passionfruit juice was characterised by the presence of an unidentified but unique sterol referred to as compound C. Juices of orange and grapefruit yielded very similar sterol profiles. They were readily distinguished from pineapple and passionfruit juices by a higher stigmasterol/campesterol ratio. Valencene/nootkatone response ratio in the hexane extracts was employed to aid in the differentiation of the 2 citrus juices. Matrix effects on the detn. of sterol and sesquiterpenoid distributions were found to be insignificant. Although natural variation and absolute uniqueness of the sterol profile for each of the 4 fruit juices were not established due to the relatively small number of fruit samples examined, the results of several compounded beverages clearly point to the potential usefulness of sterol profiles for detecting juices of orange, grapefruit, pineapple and passionfruit in mixed drinks. AA

Apples juices

991

Fukumoto (LR), Delaquis (P) and Girard (B). **Microfiltration and ultrafiltration ceramic membranes for apple juice clarification.** *Journal of Food Science* 63(5); 1998; 845-850

Depectinized control (CTJ) and ascorbic acid treated (AAJ) apple juices were filtered through microfiltration (MF, 0.2 m) and ultrafiltration (UF, 0.02 m) ceramic tubular membranes. Under optimal conditions (8 m/s, 414 kPa and 50°C), the UF membrane resulted in higher steady state flux and less fouling than the MF membrane for both juices. AAJ produced by addition of AA at milling had lower flux for both MF and UF. The chemical, physical and sensory properties of apple juices from MF and UF membranes were similar and changes during storage were comparable. AA

Citrus juices

992

Chen (CS) and Wu (MC). **Kinetic models for thermal inactivation of multiple pectinesterases in citrus juices.** *Journal of Food Science* 63(5); 1998; 747-750

Improved kinetic model of a two-component system (TCS) was developed for predicting thermal pasteurization of multiple pectinesterases (PE) in citrus juices (CJs). The conventional log-linear model (LLM) was applied to determine D- and Z-values of thermolabile and thermostable PE in CJs, resp., for use in the TCS. The TCS was more accurate and reliable than the LLM for predicting heat inactivation of PE in CJs. The TCS was especially useful for optimizing temp.-time conditions for pasteurizing CJs. SRA

Soft drinks

993

Royle (L), Ames (JM), Castle (L), Nursten (HE) and Radcliffe (CM). **Identification and quantification of class IV caramels using capillary electrophoresis and its application to soft drinks.** *Journal of the Science of Food and Agriculture* 76(4); 1998; 579-587

A capillary electrophoresis method was developed for the analysis of Class IV caramels using sodium carbonate buffer at pH 9.5. A relationship was established between the migration time of the coloured 'caramel' peak and the caramel's sulphur content. There was also a linear relationship between the concn. of caramel solids in water and the peak area of the 'caramel' peak in the range 0.1-10 g/l. A range of soft drinks was analysed for caramel. Seven non-diet and 12 diet cola products had Class IV caramel of high-sulphur, high-nitrogen content at concn. estimated to be between 0.57 and 0.82 g solids/l. AA

Tea

994

Owuor (PO) and Obanda (M). **The changes in black tea quality due to variations of plucking standard and fermentation time.** *Food Chemistry* 61(4); 1998; 435-441

Catechin levels in green leaf, total theaflavins, brightness, thearubigins, colour, flavour index and sensory evaluation decrease with coarse plucking standard in clone 6/8. The sum of Group I volatile flavour compounds and C_6 aldehydes and alcohols, in particular, increases with coarse plucking standard. The sum of Group II did not follow a particular pattern, but flavour index decreased with coarse plucking standards. The decrease in total theaflavin levels was due to the decrease in all the individual theaflavins. Although all the individual theaflavin levels decreased with coarse plucking standards, the decrease was greater in galloylated theaflavins, especially in theaflavin digallate, compared with simple theaflavin. Short fermentation times produced black teas with higher brightness and flavour index, but lower theaflavins thearubigins and colour, irrespective of plucking standard. Total theaflavins reached a max. after 90 min of fermentation, irrespective of the plucking standard, whereas ungalloylated theaflavin levels decreased with extended fermentation duration at all plucking standards, theaflavin-3-gallate and theaflavin-3, 3'-digallate levels increased, resulting in the increase in theaflavin digallate equivalent. Brightness and flavour index decreased while thearubigins, colour, and Groups I and II volatile flavour compound levels increased with long fermentation. AA

995

Toit (JD) and Joubert (E). **The effect of pretreatment on the fermentation of honeybush tea (*Cyclopia maculata*).** *Journal of the Science of Food and Agriculture* 76(4); 1998; 537-545

Different pretreatments (bruising, hot and cold water) were used to study their effect on fermentation as measured by the quality parameters of honeybush tea (*Cyclopia maculata*). Bruising and pretreatment with water (hot and cold) were investigated as means to increase the fermentation rate and to improve product quality. The development of the desired dark-brown colour and honey-like flavour during fermentation was faster in hot and cold water treated material and gave a more uniform coloured product than with the bruising pretreatment. Liquor characteristics also improved with water pretreatment. A red-brown extract, compared with the light yellow-brown of untreated samples, was obtained with the water pretreatment. Hot water pretreatment inactivated the enzymes polyphenol oxidase (PPO) and peroxidase (POD), but did not terminate or impair fermentation. The inactivation of the enzymes, together with high temp. (60°C) fermentation, indicated a chemical oxidation process rather than an enzymatic reaction in honeybush tea fermentation. AA

FATS AND OILS

Fats

996

Nasirullah, Sharma (S) and Krishnamurthy (MN). **Preparation and quality assessment of interesterified fats and their differentiation from vanaspathi (hydrogenated fats).** *Journal of Food Science and Technology (India)* 36(2); 1999; 133-135

Controlled interesterification was carried out on groundnut oil, cottonseed oil, palmolein oil individually and mixtures of groundnut oil with palmolein oil and cottonseed oil with palmolein oil in the ratios of 70:30 and 50:50. The oils and their mixtures were heated to 90°C under vacuum with 0.2% of sodium methoxide as catalyst to achieve randomisation. The interesterified fats were found to be very close to vanaspathi with regard to slip point, congeal point, iodine value, free fatty acids and moisture contents, except that they were found to be less firm and had more polyunsaturated fatty acids than vanaspathi. Silver nitrate impregnated thin layer chromatography and Fourier-Transform Infra-Red spectroscopy methods were standardised to detect and differentiate vanaspathi from interesterified fats. AA

Oils

Sunflower oils

997

Sineiro (J), Dominguez (H), Nunez (MJ) and Lema (JM). **Optimization of the enzymatic treatment during aqueous oil extraction from sunflower seeds.** *Food Chemistry* 61(4); 1998; 467-474

Partially dehulled sunflower seeds were subjected to a hydrolytic treatment with cellulases during aqueous processing for oil and protein extraction. Sub-optimal extraction conditions (particle size and separation technology) were established in order to appreciate the potential improvement caused by the enzymatic treatment and to select the best operational conditions. The effects of 3 operational variables (extraction-treatment time, water/seeds ratio and enzyme/seed ratio) were studied on 3 objective functions (the extent of hydrolysis reaction, the oil extraction yield and the percent polyphenolics removal). After 2 h of enzymatic treatment-extraction a practical optimum in the range 7.5-8 g water g^{-1} seeds and 1.25-1.4 g enzyme 100 g^{-1} seeds could be defined. Under these conditions the oil extractability and the polyphenolics removal are improved by more than 30 and 80%, resp. AA

Spices

Chillies

998

Shantha (T). **Critical evaluation of methods available for the estimation of aflatoxin B/Sub1/ in chilli powder.** *Journal of Food Science and Technology (India)* 36(2); 1999; 163-165

Efficacy of different methods of extraction, purification and estimation of aflatoxin B_1 in chillies with different levels of aflatoxin B_1 before and after equilibration of the added toxin was investigated. Levels of aflatoxin added were 10, 20, 30, 50, 70 and 100 µg kg^{-1}. When the samples were extracted before equilibration, irrespective of the method used, the percent recoveries ranged from 65 to 108. The toxin recovered was low (0-10%), if the contamination level was below 40 µg kg^{-1} in the equilibrated samples. Improved recoveries were obtained, when the added aflatoxin levels were 50, 70 and 100 µg kg^{-1}. Hexane or petroleum ether solubles seemed to bind lower levels of aflatoxin B_1. AA

Cumin seeds

999

Singh (KK) and Goswami (TK). **Mechanical properties of cumin seed (*Cuminum cyminum* Linn.) under compressive loading.** *Journal of Food Engineering* 36(3); 1998; 311-321

The moisture dependent mechanical properties of cumin seed were measured in terms of av. compressive force, seed rupture force, deformation and energy absorbed. The cumin seeds in the moisture content range of 7 to 22% d.b. were quasi-statically loaded in the horizontal and vertical orientations. The force increased with increasing deformation and decreasing moisture content in the horizontal and vertical orientations. Force required to initiate seed rupture decreased from 50 to 40 N and 31 to 20.3 N and seed deformation increased from 0.307 to 0.327 and 0.285 and 0.428 with increase in moisture content from 7 to 13% d.b. and 7 to 12% d.b. for the horizontal and vertical orientations resp. The energy absorbed increased

with increasing moisture content in the horizontal and vertical orientations and it followed a second-order polynomial regression. Cumin seed loaded in the vertical orientation required more energy for rupture than that in the horizontal orientation. Max. energy absorbed was found to be 14.8 and 20.4 mJ at the moisture content of 7% d.b. in the horizontal and vertical orientations resp. AA

SENSORY EVALUATION

1000

Kilcast (D) and Roberts (C). **Perception and measurement of stickiness in sugar-rich foods.** *Journal of Texture Studies* 29(1); 1998; 81-100

The subject of stickiness is reviewed briefly in this paper, together with the factors influencing perceived stickiness in different contexts. A clear understanding of the difference between adhesive and cohesive failure mechanisms, and the factors influencing them, is a key requirement in developing successful tests to measure stickiness. This has led to the development of an instrumental test for measuring the stickiness of confectionery products, and recommendations are made for minimising sticking of confectionery products to surfaces. AA

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

1001

Geetanjali (K) and Rashmi Kapoor. **Effect of supplementation of Egyptian clover seeds (*Trifolium alaxandrinum*) on serum and liver lipids of hypercholesterolemic rats.** *Journal of Food Science and Technology (India)* 36(2); 1999; 106-108

The effect of supplementing Egyptian clover (*Trifolium alexandrinum*) or alfalfa (*Medicago sativa*) to an atherogenic diet was investigated in rats, by determining the levels of cholesterol and triglycerides in serum and liver and the excretion of bile acids during an experimental period of 20 days. Feeding of clover seed and alfalfa-supplemented diets resulted in a significant ($P < 0.01$) reduction in total cholesterol levels of serum and liver. Consumption of alfalfa seed also showed a significant decline in the levels of serum triglycerides as compared to control. These results have indicated that the hypocholesterolemic effect of legumes in rats is mediated by the increased excretion of bile results acids. AA

BIOCHEMISTRY AND NUTRITION

1002

Vesa (TH). **Many factors affect symptoms of lactose intolerance.** *Food Reviews International* 15(2); 1999; 235-247

In this review, both recent works and early literature on lactose intolerance with regard to milk composition, gastric emptying, and functional bowel disorders are presented. Tolerance to small amounts of lactose, milk fat content, fermented milk and β-galactosidase activity are the aspects covered. 61 references. SRA

TOXICOLOGY

Nil

FOOD LAWS AND REGULATIONS

Nil

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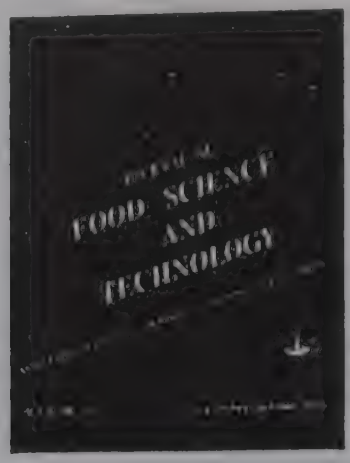

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883
Artes (F)
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Auffray (Y)
988
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917
Ayhan (T)
905
Ayhan (Z)
908
Bandler (DK)
914
Barat (JME)
898
Barclay (I)
856
Barrics (L)
978
Barrios (MJ)
933
Barroso (M)
978
Barry-Ryan (C)
886
Barsotti (L)
811 812
Batey (IL)
856
Bautista (J)
871
Bawa (AS)
863
Bayer (E)
893
Bean (S)
857
Bechtel (PJ)
924
Beerh (OP)
880
Bekes (F)
862
Bell (AE)
918 944
Bell (LN)
819
Benedito (J)
901
Berenguer-Navarro (V)
876
Berry (BW)
951
Berry (SK)
880
Bertrand (D)
822
Bhattacharya (S)
907
Bilanski (WK)
902
Bjorck (I)
842
Blair (IS)
826 827 833
Blaitta (G)
938
Blanshard (JMV)
917
Bonnin (E)
859
Boor (KJ)
914
Borderias (J)
978
Boulianne (M)
968
Bouvier (JM)
867
Bowles (BL)
825
Brackett (RE)
966
Bradbury (JH)
884
Bredie (WLP)
843
Brewer (MS)
956
Brochado (CM)
899
Brockway (BE)
918
Brullo (A)
878
Bryce (JH)
985
Burri (J)
867
Caffini (NO)
878
Canadanovic-Brunet (JM)
838
Canas (PMI)
835
Capellas (M)
965
Careche (M)
978
Carpenter (JA)
967
Carratala (MLM)
876
Castle (L)
993
Cataldi (TRI)
823
Cejpek (K)
877
Celik (S)
845
Cepeda (E)
873
Chammas (H)
925
Chan (WKM)
950
Chaplin (MF)
927
Chapman (KW)
914
Chau (C-F)
869 870
Chaudhari (AB)
836

Chauhan (GS)
818
Chauhan (RS)
832
Chaurand (M)
859
Cheftel (JC)
811 812
Chen (CS)
992
Chen (H-C)
979
Chen (H-L)
834
Chen (JY)
970
Chen (Y-H)
819
Cheney (R)
967
Cheung (PC-K)
869 870
Chew (S-Y)
977
Chimmad (BV)
875
Chin (KB)
960 961
Chincholkar (SB)
836
Chiralt (A)
898
Chism (GW)
908
Chitpintyol (S)
821
Chobert (J-M)
940
Choiset (Y)
940
Chou (S-S)
981
Chtioui (Y)
822
Chung (H-Y)
949
Clark (SA)
887
Clarke (JM)
854
Clemente (A)
871
Cooper (DJ)
985
Coppola (S)
938
Crabbe (MJC)
821
Craven (C)
982
Crosbie (G)
856
D'Souza (DN)
959
Dalgalarrondo (M)
940
Daly (J)
975
Daniels (MJ)
849
Davies (HV)
891
de Sotillo (DR)
890
Debon (SJJ)
891
Delaquis (P)
991
Delcour (JA)
855
Delerue-Matos (C)
926
Delmore (LRG)
953
Demirtas (C)
905
den Broeck (IV)
895
Derbyshire (W)
917
Desrumaux (A)
867
Devendra (S)
874
Djilas (SM)
838
Doherty (AM)
826
Dominguez (H)
997
Doyle (MP)
966
Duffy (G)
833
Dunshea (FR)
959
Dupire (S)
986
Eerola (HS)
964
Eklov (T)
962
Errington (N)
894
Eskin (NAM)
818
Esuoso (K)
893
Every (D)
887
Farber (JM)
971
Faustman (C)
950
Favell (DJ)
879
Fernandez-Trujillo (JP)
909
Ferreira (MA)
989
Fisher (TL)
900
Fito (P)
898
Flores (RA)
844
Foster (LH)
927
Frere (J)
988
Fu (J)
906
Fujita (S)
858
Fukumoto (LR)
991
Gagnaire (V)
937
Gaillard (S)
828
Garande (VK)
911
Garcia-Sanz (M)
813
Garrote (GL)
930
Geeraerd (AH)
829
Geetanjali (K)
1001
Gerrard (DE)
958
Girard (B)
991
Goff (AL)
859
Golden (DA)
900
Gomes (AMP)
932
Goswami (TK)
999
Goyal (GK)
935
Grandison (AS)
944
Grane-Teruel (N)
876
Gras (PW)
862

Graveland (A)
920
Greenfield (J)
862
Greiner (R)
852
Griffiths (MW)
919
Grigg (NP)
975
Grosch (W)
921
Guamis (B)
965
Guillen (JC)
813
Gunasekaran (S)
934
Gundavarapu (S)
974
Gupta (PK)
832
Guy (RCE)
843
Ha (SD)
969
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890
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940
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903
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919
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847
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854
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877
Hsieh (F)
864
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977
Hsu (SY)
949
Hung (Y-C)
974
Hupe (M)
990
Hutchinson (SA)
840
Hwang (D-F)
981
Hwang (J-K)
897
Ibrrola (JJ)
813
Igyor (MA)
868
Illing-Gunther (H)
820
Impe (JFV)
829
Indra Jasmine (G)
972 973
Iranzo (JFU)
835
Janardhana (GR)
866
Jany (K-D)
852
Jaswir (I)
904
Jeyachandran (P)
972 973
Jiang (S-H)
979
Jiang (S-T)
979
Jiang (Y)
906
Johansson (G)
962
Jordano (R)
933
Joubert (E)
995
Juneja (VK)
825 892
Kajuna (STAR)
902
Kakuda (Y)
816
Karthikeyan (M)
972 973
Kaster (CS)
957
Kaur (K)
851
Kawase (S)
841
Kaygusuz (K)
905
Keeton (JT)
960 961
Keshava (N)
880
Kettlewell (PS)
919
Keukeleire (DD)
983
Khamrui (K)
935
Khedkar (RM)
911
Kieffer (R)
920
Kilcast (D)
1000
Kim (C-J)
897
Kim (C-T)
897
King (AJ)
968
Kloeppel (KM)
864
Knight (DJ)
929
Kohyama (K)
850
Koike (N)
924
Koksel (H)
845
Kolbe (E)
982
Konietzny (U)
852
Konstance (RP)
865 936
Koohmaraie (M)
947
Kovacs (MIP)
854

Kowale (BN)
946 955
Krishnamurthy (MN)
996
Kutubuddin (M)
893
Kwon (YM)
969
Lacorn (M)
948
Lakshmanan (V)
954
Lal (BB)
910
Lamiot (E)
941
Lamkey (JW)
960 961
Lancaster (JE)
887
Landaud (S)
984
Langley (FM)
817
Laplace (J-M)
988
Larsen (LM)
889
Larsen (N)
922
Latshaw (JD)
970
Lebeuf (Y)
941
Lee (HO)
970
Lee (S-C)
981
Leguerinel (I)
828
Leisle (D)
854
Leitao (R)
989
Lema (JM)
997
Lent (LE)
942
Leonil (J)
937
Lerici (CR)
824
Leury (BJ)
959
Leuschner (RGK)
923
Li (R)
967
Li (Y)
864
Lieben (P)
984
Liljeberg (H)
842
Lillard (DA)
976
Lima (JLFC)
926
Lima (VLAGD)
896
Lin (S-W)
834
Linton (RH)
958
Lipp (M)
912 913
Liu (L)
814
Longnecker (MT)
960 961
Lonvaud-Funel (A)
987
Lookhart (GL)
857
Lopez (LMI)
878
Lopez (MC)
933
Lorenz (K)
924
Lortal (S)
937
Lu (D)
865
Ludikhuyze (L)
895
Ludikhuyze (LR)
829
Lundstrom (I)
962
Lutz (H)
893
Lyver (A)
971
Maciel (MIS)
896
Mafart (P)
828
Magne (V)
885
Malcata (FX)
932
Maltini (E)
824
Man (YBC)
904
Mandal (PK)
946
Manohar (B)
853
Manohar (RS)
853
Manzocco (L)
824
Marcone (MF)
816
Margiotta (G)
823
Marks (BP)
849
Martin (ST)
892
Marwaha (RS)
888
Mathlouthi (M)
885
Matsumura (Y)
841
Mauriello (G)
938
McDowell (DA)
826 827 833
McMahon (CMM)
826
McMahon (MAS)
827
McNew (RW)
849
Medina (LM)
933
Meera Rao
875
Megeri (SN)
875
Melo (EDA)
896
Mendiratta (SK)
954
Merle (P)
812
Meullenet (JF)
849
Milic (BL)
838
Millam (S)
891
Millan (F)
871
Miller (MF)
957
Milligan (SD)
957
Mills (PA)
818
Miltz (J)
916
Min (DB)
970
Mitchell (JR)
894 917

Mittal (GS)
902
Miyawaki (O)
814
Mor-Mur (M)
965
Morais (AMMB)
899
Moreau (DL)
943
Morell (MK)
856
Mori (T)
841
Morita (N)
858
Moschetti (G)
938
Mottram (DS)
843
Moya (MSP)
876
Mulholland (F)
929
Mulimani (VH)
874
Muller (M)
820
Muller (S)
860
Murakami (H)
841
Murthy (TRK)
955
Muthukumarappan (KAMM)
934
Nakamura (K)
814
Nasirullah
996
Natalucci (CL)
878
Nattress (FM)
971
Ng (L-K)
990
Nicholl (P)
882
Niven (GW)
929
Nixon (RW)
884
Nunez (MJ)
997
Nursten (HE)
993
O'Beirne (D)
886
O'Callaghan (MJA)
923
Obanda (M)
994
Ochirkhuyag (B)
940
Ogbonna (AC)
868
Ohtsubo (K)
850
Ojimelukwe (PC)
872
Ok (T)
881
Okoronkwo (S)
872
Oliveira (MB)
989
Onwulata (CI)
865 936
Osborne (BG)
922
Owuor (PO)
994
Ozer (BH)
944
Ozkara (R)
845
Pal (UK)
946
Palmer (GH)
868
Pandey (JP)
848
Panisello (PJ)
837
Paquin (P)
941
Patterson (D)
831
Perdigon (G)
945
Perez (AIB)
835
Petersen (MA)
889
Picque (D)
984
Pla (R)
965
Poll (L)
889
Popineau (Y)
822 860
Pouliot (M)
941
Poveda (EG)
876
Prendergast (M)
882
Prestamo (G)
883
Prochazka (S)
846
Psota (V)
846
Quantic (PC)
837
Raccach (M)
952
Rachid (M)
945
Radcliffe (CM)
993
Rai (T)
928
Ramsey (CB)
957
Rao (PH)
853
Rao (VK)
946 954
Raphaelides (SN)
915
Rasanen (J)
917
Rashmi Kapoor
1001
Rastogi (NK)
907
Raveesha (KA)
866
Reynolds (AE)
974
Richter (ER)
908
Ricke (SC)
969
Roberts (C)
1000
Robilland (B)
885
Robinson (RK)
944
Rocha (AMCN)
899
Rosenberg (M)
943
Rosenberry (LC)
914
Rossello (C)
901
Rouau (X)
861
Royle (L)
993
Sagues (AXR)
964
Sah (PC)
848
Saha (U)
955

Sanchez (ES)
901
Sanchez-Vioque (R)
871
Sandoval (JM)
813
Sanz (Y)
963
Sapers (GM)
892
Sarker (DK)
822
Saulnier (L)
859
Schaefer (DM)
950
Schmidt (GR)
953
Schmidt (KA)
939
Seabra (RM)
989
Sehgal (RC)
880
Sekhon (KS)
851
Selamat (J)
904
Seron (LH)
876
Shackelford (SD)
947
Shadarevian (S)
925
Shanmugam (SA)
973
Shantha (T)
998
Sharma (KD)
910
Sharma (S)
996
Sharp (PJ)
856
Shaw (ML)
887
Sheridan (JJ)
826 833
Shetty (HS)
866
Shewry (PR)
862
Shiau (H-W)
981
Shiozawa (K)
850
Shomer (I)
857
Shumaker (EK)
931
Sidhu (JS)
863
Siebenmorgen (TJ)
849
Silva (IPD)
896
Silva (MRFD)
896
Simal (S)
901
Sineiro (J)
997
Singh (B)
851
Singh (J)
863
Singh (KK)
999
Singh (N)
851
Skerritt (JH)
922
Smith (GC)
953
Smith (JP)
971
Smith (PW)
865 936
Smout (C)
815
Sofos (JN)
953
Sohier (D)
987
Sorgentini (DA)
878
Steinhart (H)
948
Stewart (GG)
985
Stewart (M)
975
Stoforos (NG)
810
Strange (ED)
865
Strobaugh (TP)
830
Su (H-P)
834
Su (S-C)
981
Sugimoto (Y)
858
Sugisawa (H)
904
Sumar (S)
927
Surget (A)
861
Tamas (L)
862
Taoukis (PS)
810
Tarte (I)
971
Tatham (AS)
862
Tester (RF)
891
Thibault (J-F)
859
Thompson (LD)
957
Toit (JD)
995
Toldra (F)
963
Tong (PS)
942
Toufeili (I)
925
Toyoshima (H)
850
Tu (S-I)
831
Tucker (GA)
894
Tunick (MH)
865
Uknalis (J)
831
Urban (J)
877
Valdez (JC)
945
van Loey (A)
815
Vanasupa (LS)
942
Vandamme (A)
855
Vasiliver (R)
857
Vaz (MCVF)
926
Veena Pal
848
Velisek (J)
877
Veraverbeke (WS)
855
Verbruggen (IM)
855
Vesa (TH)
1002
Vieira (MM)
932
Villani (F)
938

Villaran (MC)
873
Vioque (J)
871
Wagner (JR)
878
Wallington (DJ)
919
Walsh (D)
833
Wang (L)
844
Wang (Y-C)
934
Warner (RD)
959
Waskar (DP)
911
Watanabe (E)
918
Weemaes (C)
895
Wendorff (WL)
931
Wesley (IJ)
922
Wheeler (TL)
947
White (KL)
819
Whiting (RC)
830
Wieser (H)
860 920
Wilson (R)
856
Winquist (F)
962
Wolf-Hall (C)
890
Wong (E)
958
Wong (Y-S)
870
Wongso (S)
980
Wu (MC)
992
Wu (W-H)
976
Xu (Z)
915
Yada (RY)
816
Yamamori (M)
858
Yamamoto (H)
858
Yamanaka (H)
980
Yenagi (NB)
875
Yu (P-C)
981
Yusof (S)
904
Yuste (J)
965
Zambonin (CG)
823
Zehentbauer (G)
921
Zhao (X-C)
856
Zhao (Y)
982
Zhu (LG)
956
Zuckerman (H)
916

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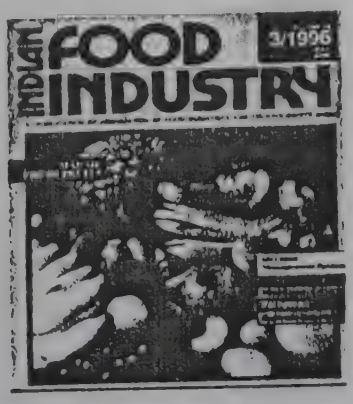

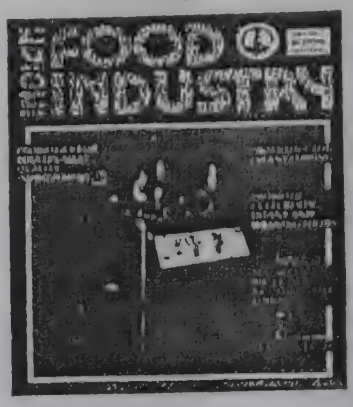

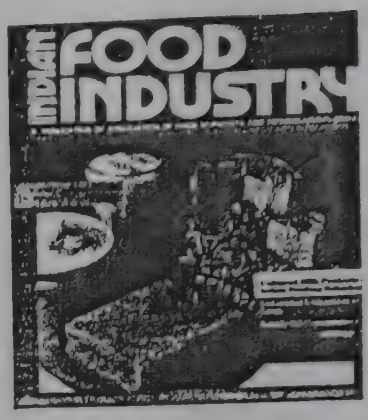

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Abscisic acid
barley caryopses, indole-3-acetic acid/ abscisic acid & germination of spring 846
Acerola
Malpighia fruit/ products, processing/ storage of acerola 896
Acetic acid
barley caryopses, indole-3-acetic acid/ abscisic acid & germination of spring 846
Acids
beet sugar, organic acids/ inorganic anions detn. ionic HPLC in 885
Additives
foodborne bacterial pathogens inhibition by additives 825
Adenosine triphosphates
Escherichia coli, adenosine triphosphate & fluorescence enhancement of 4',6-diamidino-2-phenylindole -labelled 831
Aeromonas hydrophila
filamentation in Aer. hydrophila 827
poultry, plant extracts & Aeromonas hydrophila/ Listeria monocytogenes inhibition in refrigerated/ cooked 966
Aflatoxins
chilli powders, aflatoxins estimation in 998
Alditols
foods, alditols detn. HPAEC in 823
Alitame
stability/ degradation of alitame 840
Allinases
onions, allinase flavour characteristics in 887
Allyl isothiocyanates
mustard pastes, sulphite treatment & allyl isothiocyanate in 877
Almonds
amino acids composition & characterisation of almond cvs 876
Aluminium
foodstuffs containing aluminium 820
Amines
sausages, Lactobacillus sake aminopeptidases & amines in dry 963
sausages, biogenic amines in Finnish dry 964
Amino acids
almond cvs, amino acids composition & characterisation of 876
milk, Lactococcus lactis & amino acids concn. in 929
shark fins, protein/ amino acid profiles capillary electrophoresis in natural/ artificial 981
Aminopeptidases
sausages, Lactobacillus sake aminopeptidases & amines in dry 963
Amylases
artificial neural networks & isobaric-isothermal inactivation of Bacillus subtilis α-amylases 829
Amylopectins
starch formation/ glycaemic indices, amylose/ amylopectin ratio & baking condition on resistant starch formation/ glycaemic indices 842
Amylose
rice, amylose content & electromyographic study on cooked 850
starch formation/ glycaemic indices, amylose/ amylopectin ratio & baking condition on resistant 842
Antimicrobials
potato peel extract, antimicrobial activity of 890
Antioxidants
phenolic compounds, lipid peroxidation system & antioxidative activity of 838
prolamin subunits, antioxidative activity of 841
Apple juices
clarification, microfiltration/ ultrafiltration ceramic membranes for apple juice 991
Apples
chemical treatment & quality of cut apples 899
cider, dimethyl dicarbonate/ sodium bisulphites/ sodium benzoate & Escherichia coli survival in apple 900
pomace, pectin & extrusion of apple 897
Aroids
raphides acridity in edible aroids 884
Aroma
bread, crust aroma of 921
Ascorbic acid
goat meat, EDTA/ ascorbic acid dip treatment & storage stability of 955
Aspartame
stability/ degradation of aspartame 840
Aspartic proteinases
821
Bacillus
bread, Bacillus spoilage in part-baked/ rebaked brown soda 923
Bacillus cereus
temp./ pH/ a_w & thermal inactivation of B. cereus 828
Bacillus subtilis
amylases, artificial neural networks & isobaric-isothermal inactivation of B. subtilis 829
Bacteria
foodborne bacterial pathogens inhibition by additives 825
Baking
amylose/ amylopectin ratio & baking condition on resistant starch formation/ glycaemic indices 842
catfish fillets, oven baking & cholesterol/ proximate composition of channel 976
wheat flour quality & performance of baking 844
Bananas
storage & colour changes in bananas 902
Barleys
γ-irradiation & malting quality of barleys 845
germinative capacity detn. method for barleys 847
indole-3-acetic acid/ abscisic acid & germination of spring barley caryopses 846
Beef
decontamination sequential spraying treatments of inoculated beef 953
deterioration analysis/ prediction of comminuted beef 952
patties, fat content/

frozen-thawed beef & colour of cooked high pH beef 951
vitamin E & quality of beef 950
Beer
diacetyl/ pentanedione analysis GC/MS during beer fermentation 984
vicinal diketones detn. headspace-capillary GC in beer 986
Beet sugar
organic acids/ inorganic anions detn. ionic HPLC in beet sugar 885
Beverages
fruit juices, sterol analysis in 990
Bile salt
Lactobacillus acidophilus, acidic pH/ bile salt & hypocholesterolemic/ antagonistic strain survival of 832
Biomass
Telfairia occidentalis biomass, chemical composition/ potential of underutilized tropical fluted 893
Blood
foods, slaughter house blood utilization in 946
Bologna
functional/ textural/ microstructural properties of low fat bologna-konjac blend 961
low-fat bologna & konjac blends 960
Bread
Bacillus spoilage in part-baked/ rebaked brown soda bread 923
baguettes, crust aroma of 921
steamed bread from Colorado grown white wheat 924
storage/ quality & textural attributes of Arabic bread 925
Breadmaking
wheat flour, breadmaking performance of 920
Brewing
head retention during high gravity brewing 985
Broilers
chicken carcasses, meat colour/ biochemical characteristics of dark coloured 968
Browning
litchies, glutathione/ citric acid & polyphenol oxidase inhibition/ browning control of 906
Cakes
corn cakes, moisture content & texture of glassy 864
Calcium chloride
lamb Callipyge longissimus, prerigor freezing/ postrigor $CaCl_2$ injection & tenderness of 947
mutton, post-mortem $CaCl_2$ injection & tenderisation of 954
Canning
plum var., osmotic dehydration/ canning & drain wt./ quality of 910
Caramels
soft drinks, caramels quantification/ identification capillary electrophoresis/ applications to 993
Carbon dioxide
catfish, carbon dioxide evolution & shelf-life detn. of refrigerated 977
Carboxymethylcellulose
wheat var., carboxymethylcellulose & rheological/ gas formation/ gas retention properties of Punjab 863
Carcasses
chicken carcasses, meat colour/ biochemical characteristics of dark coloured 968
pork, resting period/ chilling method/ carcass trimming & quality of 957
Carrots
slices, slicing method & quality/ shelf-life of fresh cut carrot 886
Catfish
carbon dioxide evolution & shelf-life detn. of refrigerated catfish 977
fillets, microwave heating/ deep-fat frying/ oven baking & cholesterol/ proximate composition of channel catfish 976
Cheddar cheese
microbial changes in flexible plastic films ripened cheddar cheese 935
Cheese
emmental cheese juice, peptidases in pre-ripened 937
fungal biota isolated from Spanish cheeses 933
melt/ flow characteristics of cheeses 934
pink discoloration in annatto-coloured pasteunsed process cheese 931
probiotic microbial strains survival during ripening of cheeses 932
Cheese-whey
extruded products, cheese-whey & physical properties of 936
Chickens
carcasses, meat colour/ biochemical characteristics of dark coloured broiler chickens 968
Chickpea
cooking & protein quality of chickpeas 871
Chilli powders
aflatoxin B_1 estimation in chilli powders 998
Chilling
albacore tuna, chilling/ freezing computer simulation of 982
pork, resting period/ chilling method/ carcass trimming & quality of 957
Chipping
potato var., chipping quality/ processing characteristics of Indian 888
Chlorine
shrimps, washing/ chlorine disinfection & quality/ shelf-life of iced cultured 973
Chocolate milk
light-oxidised flavour development & vitamin A degradation in chocolate milk 914
Chocolates
cocoa butter/ alternative fats use in chocolates 912 913
Cholesterol
catfish fillets, microwave heating/ deep-fat frying/ oven baking & cholesterol/ proximate composition of channel 976
clover seeds, hypercholesterolemic rats, Egyptian clover seeds supplementation & serum/ liver lipids of 1001
gum arabic fed rats, plasma/ lipoprotein cholesterol/ organ cholesterol/ growth performance in dietary 839
Chromatography
foods, sugars/alditols detn. HPAEC in 823
Chymosin
proteinases - chymosin 821

Cider
microbial contamination during traditional French cider making 988
Citric acid
litchies, glutathione/ citric acid & polyphenol oxidase inhibition/ browning control of 906
Citrus juices
pectinesterase thermal inactivation kinetic models in citrus juices 992
Clostridium botulinum
time-to-turbidity model for proteolytic Cl. botulinum 830
Clover seeds
hypercholesterolemic rats, Egyptian clover seeds supplementation & serum/ liver lipids of 1001
Cocoa butter
chocolates, cocoa butter/ alternative fats use in 912 913
Coffee
dimethoxycinnamic acid levels & differentiation of Coffea canephora var. robusta/ Coffea arabica 989
Colour
bananas/ plantains, storage & colour changes in 902
beef patties, fat content/ frozen-thawed beef & colour of cooked high pH 951
chicken carcasses, meat colour/ biochemical characteristics of dark coloured 968
peaches, intermittent warming/ modified atm. packaging & colour developments in 909
Colourimetry
milk, Fe/ Cu automation detn. FIA systems/ colourimetric detection in 926
Computer
albacore tuna, chilling/ freezing computer simulation of 982
Concentration
milk, Lactococcus lactis & amino acids concn. in 929
solute partition constant in progressive freeze-concn. 814
Consumers
shrimps, consumer acceptance & quality of microwave-cooked 974
Contamination
beef, decontamination sequential spraying treatments of inoculated 953
cider making, microbial contamination during traditional French 988
Cooking
chickpeas, cooking & protein quality of 871
red gram flour, soaking/ cooking/ crude α-galactosidase treatment & oligosaccharides content of 874
Copper
milk, Cu automation detn. FIA systems/ colourimetric detection in 926
Corn
cakes, moisture content & texture of glassy corn 864
extrudates, corn grits particle size/ distribution & characteristics of expanded 867
sensory characterisation of extruded corn 843
storage mod. atm. & nutritional loss prevention in corn 866
twin-screw extrusion & nutrient-based corn products 865
Cowpeas
seeds, Xylopia aethiopica & shelf-life of cowpea 872
Cumin seeds
compressive loading & mechanical properties of cumin seeds 999
Curry
ready-to-use vegetable curry gravy, preparation/ preservation/ storage of 880
Dates
rheological behaviour of date-water conc. 903
Decontamination
beef, decontamination sequential spraying treatments of inoculated 953
Degradation
sweeteners, stability/degradation of 840
Diacetyl
beer fermentation, diacetyl/ pentanedione analysis GC/MS during 984
Diketones
beer, vicinal diketones detn. headspace-capillary GC in 986
Dimethoxycinnamic acid
Coffea canephora var. robusta/ Coffea arabica, dimethoxycinnamic acid levels & differentiation of 989
Dimethyl dicarbonates
apple cider, dimethyl dicarbonate & Escherichia coli survival in 900
Discoloration
cheese, pink discoloration in annatto-coloured pasteurised process 931
pork, discoloration of fresh 956
Disulphides
gliadins, disulphide bonds of 860
Dough
hordeins, heterologous expression/ dough mixing of wild-type/ mutant C 862
microwave oven heated temp. profiles in dough 916
monitoring NIR spectroscopy of dough mixing 922
properties of subzero temp. stored frozen wheat dough 917
rheology, protein disulphide isomerase fundamental/ empirical testing assessment on dough 918
sulphur/ nitrogen concn. & extensibility of wheat dough 919
Dried foods
sausages, Lactobacillus sake aminopeptidases & amines in dry 963
Drying
faba bean protein flour, spray/ freezing drying & functional properties of 873
hazelnuts, drying behaviour of 905
plum var., osmotic dehydration/ canning & drain wt./ quality of 910
ultrasound & mass transport rates during osmotic dehydration 901
Durian
leather, glucose syrup solid/ sucrose/ hydrogenated palm oil/ soy lecithin & sensory properties of durian 904
EDTA
goat meat, EDTA/ ascorbic acid dip treatment & storage stability of 955
Edible films
edible films, structure detn. atomic force microscope of whey protein 942
Egg yolk
α-tocopherol content & oxidative stability of egg yolk 970
Electromyography
rice, amylose content & electromyographic study on cooked 850

Electronic nose
sausage fermentation, electronic nose monitoring of 962
Electrophoresis
shark fins, protein/ amino acid profiles capillary electrophoresis in natural/ artificial 981
Emulsification
meatballs, processing factors & quality of emulsified 949
Enzymes
mango pulp, rheological properties of enzyme-treated 907
sorghum wort, malting temp./ time & enzyme development/ properties of 868
sunflower seeds, enzymatic treatment during aqueous oil extraction from 997
wheat arabinoxylan-degrading enzymic extracts, characterisation of endogenous 859
wine yeasts, oenological characteristics/ enzymatic activities of 835
Escherichia coli
adenosine triphosphate & fluorescence enhancement of 4',6-diamidino-2-phenylindole -labelled E. coli 831
apple cider, dimethyl dicarbonate/ sodium bisulphites/ sodium benzoate & Escherichia coli survival in 900
pork skin/ muscle, Escherichia coli/ Salmonella senftenberg reduction UV light on 958
Ethyl alcohol
osmotolerant Schizosaccharomyces for ethanol production 836
Exopolysaccharides
sour-cream, exopolysaccharide-producing lactic acid & physical properties of low-fat 939
Extruded foods
cheese-whey & physical properties of extruded foods 936
corn grits particle size/ distribution & characteristics of expanded extrudates 867
corn/ wheat flour, sensory characterisation of extruded 843
Extrusion
apple pomace, pectin & extrusion of 897
corn/ soy products, twin-screw extrusion & nutrient-based 865
rice grits, hydrocolloids/ process variables & extrusion behaviour of 851
Faba beans
protein flour, spray/ freeze drying & functional properties of faba bean 873
Fat-low foods
bologna - low-fat & konjac blends 960
sour-cream, exopolysaccharide-producing lactic acid & physical properties of low-fat 939
Fats
chocolates, cocoa butter/ alternative fats use in 912 913
differentiation between fat/ vanasapathi 996
preparation/ quality assessment of interestrified fats 996
Fats meat
beef patties, fat content/ frozen-thawed beef & colour of cooked high pH 951
bologna-konjac blend, functional/ textural/ microstructural properties of low fat 961
Fats milk
goat milk fat fractions, storage stability of 928
whey protein - microcapsules, anhydrous milkfat & porosity of whey protein-based 943
Fermentation
black tea, plucking standard/ fermentation time & quality changes in 994
honeybush tea Cyclopia maculata, pretreatment & fermentation of 995
sausage fermentation, electronic nose monitoring of 962
thermal/ physical properties changes in alcoholic fermentation 824
Fermented foods
vegetable extracts, sugar-tolerant yeasts isolated from high-sugar fermented 881
Films
cheddar cheese, microbial changes in flexible plastic films ripened 935
Fish products
packaging, statistical process control in fish product 975
Flavourings
yoghurt-type products, yeast cultures characterisation & flavouring agents in 834
Flavours
chocolate milk, light-oxidised flavour development & vitamin A degradation in 914
onions, allinase flavour characteristics in 887
Flours
pulse flours, functional properties of Chinese 869
red gram flour, soaking/ cooking/ crude α-galactosidase treatment & oligosaccharides content of 874
Foam
image analysis & characterisation of foam properties 822
Freeze drying
faba bean protein flour, spray/ freeze drying & functional properties of 873
Freezing
albacore tuna, chilling/ freezing computer simulation of 982
lamb Callipyge longissimus, prerigor freezing/ postrigor $CaCl_2$ injection & tenderness of 947
solute partition constant in progressive freeze-concn. 814
Frozen foods
beef patties, fat content/ frozen-thawed beef & colour of cooked high pH 951
vegetables, vitamin C content of fresh/ frozen 879
wheat dough, properties of subzero temp. stored frozen 917
Fruits
acerola Malpighia fruit/ products, processing/ storage of 896
Frying
catfish fillets, deep-fat frying & cholesterol/ proximate composition of channel 976
Fungi
cheeses, fungal biota isolated from Spanish 933
Galactosidases
red gram flour, soaking/ cooking/ crude α-galactosidase treatment & oligosaccharides content of 874
Gas
wheat var., carboxymethyl cellulose & rheological/ gas formation/ gas retention properties of Punjab 863
Gas chromatography
beer fermentation, diacetyl/ pentanedione analysis GC/MS

during 984
beer, vicinal diketones detn. headspace-capillary GC in 986
potatoes, volatiles comparison extraction techniques/ GC odour profiling/ GC-MS in raw/ boiled 889
Gliadins
disulphide bonds of gliadins 860
ultrstructure of consecutively extracted/ flocculated gliadins 857
Globulins
isolation/ purification/ characterisation of salt-soluble dicotyledonous/ monocotyledonous plant seed globulins 816
Glucose
durian leather, glucose syrup solid/ sucrose/ hydrogenated palm oil/ soy lecithin & sensory properties of 904
Glutathione
litchies, glutathione/ citric acid & polyphenol oxidase inhibition/ browning control of 906
Glutenins
isolation of low/ high mole. wt. wheat glutenin subunits 855
ultrastructure of consecutively extracted/ flocculated glutenins 857
Grains
kefir, characteristics of different grain:milk prepared 930
Grapefruit juices
sterol analysis in grapefruit juices 990
Gravy
ready-to-use vegetable curry gravy, preparation/ preservation/ storage of 880
Gum arabic
plasma/ lipoprotein cholesterol/ organ cholesterol/ growth performance in dietary gum arabic fed rats 839
HACCP
food micromodel predictive software application in HACCP systems development 837
HPLC
beet sugar, organic acids/ inorganic anions detn. ionic HPLC in 885
Hakes
fillets, texture/ viscosity of frozen hake 978
Handling
shrimps, post-harvest handling & shelf-life of iced cultured 972
Hazelnuts
drying behaviour of hazelnuts 905
Heat
milk, heat treatment/ intrinsic/ fortified Se levels in cow's 927
retort, heat distribution in industrial-scale water cascading 815
Heating
catfish fillets, microwave heating & cholesterol/ proximate composition of channel 976
dough, microwave oven heated temp. profiles in 916
peaches, intermittent warming/ modified atm. packaging & colour developments in 909
Hops
quality of hop/ hop products 983
Hormones
food, steroid hormones occurrence in 948
Hydrocolloids
rice grits, hydrocolloids/ process variables & extrusion behaviour of 851
Hydrolysis
nitrophenyl gluctosides, hydrolysis of 817
Hypocholesterolemic
Lactobacillus acidophilus, acidic pH/ bile salt & hypocholesterolemic/ antagonistic strain survival of 832
Image analysis
foam properties, image analysis & characterisation of 822
Interesterification
fats, preparation/ quality assessment of interestrified 996
Iron
milk, Fe automation detn. FIA systems/ colourimetric detection in 926
Irradiation
malt, γ-irradiation & malting quality of 845
Kefir
characteristics of different grain:milk prepared kefir 930
Lactic acid
sour-cream, exopolysaccharide-producing lactic acid & physical properties of low-fat 939
Lactic acid bacteria
wines, lactic acid bacteria detection/ identification hybridization method in 987
Lactobacillus acidophilus
acidic pH/ bile salt & hypocholesterolemic/ antagonistic strain survival of Lact. acidophilus 832
Lactobacillus sake
sausages, Lact. sake aminopeptidases & amines in dry 963
Lactococcus lactis
cheese, Lact. lactis proteolytic activity in Mozzarella 938
milk, Lact. lactis & amino acids concn. in 929
Lactose
intolerance of lactose 1002
Lambs
Callipyge longissimus, prerigor freezing/ postngor $CaCl_2$ injection & tenderness of lamb 947
Light
chocolate milk, light-oxidised flavour development & vitamin A degradation in 914
Lipids
phenolic compounds, lipid peroxidation system & antioxidative activity of 838
Lipoproteins
gum arabic fed rats, plasma/ lipoprotein cholesterol/ organ cholesterol/ growth performance in dietary 839
Listeria
foods, Listeria sp. isolation from 833
Listeria monocytogenes
meat/ potato substrates, Yersinia enterocolitica/ L. monocytogenes thermal resistance in 826
potatoes, L. monocytogenes control in vacuum packaged pre-peeled 892
poultry, plant extracts & Aeromonas hydrophila/ Listeria monocytogenes inhibition in refrigerated/ cooked 966
seafood products, Listeria monocytogenes & modified atm. stored value-added 971
Litchies
glutathione/ citric acid & polyphenol oxidase inhibition/ browning control of litchies 906
Loading
cumin seeds, compressive loading & mechanical properties of 999

Lysines
poultry meat, microbiological quality of high hydrostatic pressure/ lysine treated mechanically recovered 965
Mackerels
surimi, Saccharomyces cerevisiae NADPH-sulphite reductase & quality of ozonated mackerel 979
Magnesium
pork, dietary Mg aspartate supplementation & quality of 959
Maillard reactions
buffer type/ concn. & Maillard reaction in glassy low-moisture solids 819
Malt
γ-irradiation & malting quality of malt 845
Mangoes
pulp, rheological properties of enzyme-treated mango 907
Mass spectrometry
beer fermentation, diacetyl/ pentanedione analysis GC/MS during 984
potatoes, volatiles comparison extraction techniques/ GC odour profiling/ GC-MS in raw/ boiled 889
Meat
processing factors & quality of emulsified meatballs 949
Yersinia enterocolitica/ Listeria monocytogenes thermal resistance in meat/ potato substrates 826
Melons
shelf-life of minimally processed fresh cut melons 908
Microfiltration
apple juices clarification, microfiltration/ ultrafiltration ceramic membranes for 991
Microorganisms
cheddar cheese, microbial changes in flexible plastic films ripened 935
cheeses, probiotic microbial strains survival during ripening of 932
cider making, microbial contamination during traditional French 988
poultry meat, microbiological quality of high hydrostatic pressure/ lysine treated mechanically recovered 965
Microscopy
edible films, structure detn. atomic force microscope of 942
Microwaves
catfish fillets, microwave heating & cholesterol/ proximate composition of channel 976
dough, microwave oven heated temp. profiles in 916
shrimps, consumer acceptance & quality of microwave-cooked 974
Milk
heat treatment/ intrinsic/ fortified Se levels in cow's milk 927
iron/ Cu automation detn. FIA systems/ colourimetric detection in milk 926
kefir, characteristics of different grain:milk prepared 930
Lactococcus lactis & amino acids concn. in milk 929
storage stability of goat milk fat fractions 928
Milk products
yoghurt-type products, yeast cultures characterisation & flavouring agents in 834
Mixing
dough mixing, monitoring NIR spectroscopy of 922
Moisture
corn cakes, moisture content & texture of glassy 864
Mozzarella cheese
Lactococcus lactis proteolytic activity in Mozzarella cheese 938
Muscles
scallop, muscle extractive components & changes during refrigerated storage of Japanese baking 980
Mustards
pastes, sulphite treatment & allyl isothiocyanate in mustard 877
Mutton
EDTA/ ascorbic acid dip treatment & storage stability of goat meat 955
post-mortem $CaCl_2$ injection & tenderisation of sheep meat 954
NIR
dough mixing, monitoring NIR spectroscopy of 922
Nitrogen
wheat dough, sulphur/ nitrogen concn. & extensibility of 919
Nitrophenyl glucosides
hydrolysis of nitrophenyl glucosides 817
Noodles
starch granule properties/ noodle quality in wheat 856
Nutrients
corn/ soy products, twin-screw extrusion & nutrient-based 865
winged beans, physicochemical characteristics/ nutrient composition of 875
Nutritional values
corn, storage mod. atm. & nutritional loss prevention in 866
quinoa proteins, saponin extraction & nutritional quality of 818
Oligosaccharides
red gram flour, soaking/ cooking/ crude α-galactosidase treatment & oligosaccharides content of 874
Onions
allinase flavour characteristics in onions 887
Orange juices
sterol analysis in orange juices 990
Osmosis
plum var., osmotic dehydration/ canning & drain wt./ quality of 910
structure & equilibrium in cellular food osmotic sol. systems 898
ultrasound & mass transport rates during osmotic dehydration 901
Oxidation
egg yolk, α-tocopherol content & oxidative stability of 970
Packaging
fish product packaging, statistical process control in 975
peaches, intermittent warming/ modified atm. packaging & colour developments in 909
Palm oils
durian leather, glucose syrup solid/ sucrose/ hydrogenated palm oil/ soy lecithin & sensory properties of 904
Passionfruit juices
sterol analysis in passionfruit juices 990
Pastes
mustard pastes, sulphite treatment & allyl isothiocyanate in 877
Pasteurization
modelling of HTST pasteurization process 813

Pathogens
foodborne bacterial pathogens inhibition by additives 825
Peaches
intermittent warming/ modified atm. packaging & colour developments in peaches 909
Pectinesterases
citrus juices, pectinesterase thermal inactivation kinetic models in 992
Pectins
apple pomace, pectin & extrusion of 897
Pentanedione
beer fermentation, diacetyl/ pentanedione analysis GC/MS during 984
Pentosanases
wheat flour, pentosanases inhibitor in 861
Peptidases
emmental cheese juice, peptidases in pre-ripened 937
Peroxidation
phenolic compounds, lipid peroxidation system & antioxidative activity of 838
Phenolic compounds
lipid peroxidation system & antioxidative activity of phenolic compounds 838
Phytases
ryes, purification/ properties from 852
Pineapple juices
sterol analysis in pineapple juices 990
Plantains
storage & colour changes in plantains 902
Plants
poultry, plant extracts & Aeromonas hydrophila/ Listeria monocytogenes inhibition in refrigerated/ cooked 966
Plasma
gum arabic fed rats, plasma/ lipoprotein cholesterol/ organ cholesterol/ growth performance in dietary 839
Plastics
cheddar cheese, microbial changes in flexible plastic films ripened 935
Plucking
black tea, plucking standard/ fermentation time & quality changes in 994
Plums
osmotic dehydration/ canning & drain wt./ quality of plum var. 910
Pluses
flours, functional properties of Chinese pluse 869
Polishing
rice, polishing & composition of milled 848
Polyphenoloxidases
high pressure inactivation of polyphenoloxidases 895
litchies, glutathione/ citric acid & polyphenoloxidase inhibition/ browning control of 906
Pomace
apple pomace, pectin & extrusion of 897
Pomegranates
post-harvest treatments & shelf-life/ quality of pomegranates 911
Pork
dietary Mg aspartate supplementation & quality of pork 959
discoloration of fresh pork 956
resting period/ chilling method/ carcass trimming & quality of pork 957
skin/ muscle, Escherichia coli/ Salmonella senftenberg reduction UV light on pork 958
Porridge
wheat porridge, rheological characterisation of 853
Potato starch
temp. & synthesis/ composition/ physical properties of potato microtuber starch 891
Potatoes
antimicrobial activity of potato peel extract 890
chipping quality/ processing characteristics of Indian potato var. 888
Listeria monocytogenes control in vacuum packaged pre-peeled potatoes 892
volatiles comparison extraction techniques/ GC odour profiling/ GC-MS in raw/ boiled potatoes 889
Yersinia enterocolitica/ Listeria monocytogenes thermal resistance in meat/ potato substrates 826
Poultry
meat, microbiological quality of high hydrostatic pressure/ lysine treated mechanically recovered poultry 965
plant extracts & Aeromonas hydrophila/ Listeria monocytogenes inhibition in refrigerated/ cooked poultry 966
sensory/ instrumental properties of mechanically separated poultry meat/ wheat protein based smoked 967
Powders
whey powders, hydration of 941
Preservation
ready-to-use vegetable curry gravy, preparation/ preservation/ storage of 880
Probiotics
cheeses, probiotic microbial strains survival during ripening of 932
Processing
food processing by pulsed electric fields 811 812
Prolamins
antioxidative activity of prolamin subunits 841
Propionic acid
Salmonella typhimurium, propionic acid & growth response of 969
Proteinases
chymosin/ aspartic proteinases 821
Proteins
chickpeas, cooking & protein quality of 871
dough rheology, protein disulphide isomerase fundamental/ empirical testing assessment on 910
shark fins, protein/ amino acid profiles capillary electrophoresis in natural/ artificial 981
Proteins cereal
heterologous expression/ dough mixing of wild-type/ mutant C hordeins 862
sausages, sensory/ instrumental properties of mechanically separated poultry meat/ wheat protein based smoked 967
wheat, quality characteristics of high protein derived durum 854
Proteolysis
cheese, Lactococcus lactis proteolytic activity in Mozzarella 938
Pulps
mango pulp, rheological properties of enzyme-treated 907
Pulses
seeds, chemical composition of

underutilized Chinese legume 870
Pumpkins
Telfairia occidentalis biomass, chemical composition/ potential of underutilized tropical fluted pumpkin 893
Quinoa
proteins, saponin extraction & nutritional quality of quinoa 818
Ready-to-use foods
vegetable curry gravy, preparation/ preservation/ storage of ready-to-use 880
Red gram
flour, soaking/ cooking/ crude α-galactosidase treatment & oligosaccharides content of red gram 874
Retort
heat distribution in industrial-scale water cascading retorts 815
Rheological properties
date-water conc., rheological behaviour of 903
wheat flour, rheological measurements of 920
wheat porridge, rheological characterisation of 853
wheat var., carboxymethylcellulose & rheological/ gas formation/ gas retention properties of Punjab 863
yoghurts, rheological properties of conc. 944
Rice
amylose content & electromyographic study on cooked rice 850
grits, hydrocolloids/ process variables & extrusion behaviour of rice 851
polishing & composition of milled rice 848
quality & storage of long-grain rough rice 849
Ripening
cheeses, probiotic microbial strains survival during ripening of 932
Ryes
phytase purification/ properties from ryes 852
Saccharomyces cerevisiae
mackerel surimi, Sacch. cerevisiae NADPH-sulphite reductase & quality of ozonated 979
Salads
sodium dicholorisocyanurate disinfection of shredded salad ingredients 882
Salmonella senftenberg
pork skin/ muscle, Escherichia coli/ Salmonella senftenberg reduction UV light on 958
Salmonella typhimurium
propionic acid & growth response of Salmonella typhimurium 969
Saponins
quinoa proteins, saponin extraction & nutritional quality of 818
Sausages
biogenic amines in Finnish dry sausages 964
electronic nose for monitoring sausage fermentation 962
Lactobacillus sake aminopeptidases & amines in dry sausages 963
sensory/ instrumental properties of mechanically separated poultry meat/ wheat protein based smoked sausages 967
Scallop
muscle extractive components & changes during refrigerated storage of Japanese baking scallop 980
Schizosaccharomyces
ethanol production, osmotolerant Schizosaccharomyces for 836
Seafoods
products, Listeria monocytogenes & modified atm. stored value-added seafood 971
Selenium
milk, heat treatment/ intrinsic/ fortified Se levels in cow's 927
Sensory properties
corn/ wheat flour, sensory characterisaton of extruded 843
durian leather, glucose syrup solid/ sucrose/ hydrogenated palm oil/ soy lecithin & sensory properties of 904
sausages, sensory/ instrumental properties of mechanically separated poultry meat/ wheat protein based smoked 967
Shark
fins, protein/ amino acid profiles capillary electrophoresis in natural/ artificial shark 981
Shelf-life
carrot slices, slicing method & quality/ shelf-life of fresh cut 886
catfish, carbon dioxide evolution & shelf-life detn. of refrigerated 977
cowpea seeds, Xylopia aethiopica & shelf-life of 872
melons, shelf-life of minimally processed fresh cut 908
pomegranates, post-harvest treatments & shelf-life/ quality of 911
shrimps, post-harvest handling & shelf-life of iced cultured 972
shrimps, washing/ chlorine disinfection & quality/ shelf-life of iced cultured 973
Shrimps
consumer acceptance & quality of microwave-cooked shrimps 974
post-harvest handling & shelf-life of iced cultured shrimps 972
washing/ chlorine disinfection & quality/ shelf-life of iced cultured shrimps 973
Slaughter
foods, slaughter house blood utilization in 946
Slicing
carrot slices, slicing method & quality/ shelf-life of fresh cut 886
Soaking
red gram flour, soaking/ cooking/ crude α-galactosidase treatment & oligosacchandes content of 874
Sodium benzoates
apple cider, sodium benzoate & Escherichia coli survival in 900
Sodium bisulphites
apple cider, sodium bisulphites & Escherichia coli survival in 900
Sodium dicholorisocyanurates
salad ingredients, sodium dicholorisocyanurate disinfection of shredded 882
Soft drinks
caramels quantification/ identification capillary electrophoresis/ applications to soft drinks 993
Solubility
soy conc., proteases & thermal behaviour/ solubility/ structural properties of 878
Sorghum
malting temp./ time & enzyme development/ properties of sorghum wort 868

Sour-cream
exopolysaccharide-producing lactic acid & physical properties of low-fat sour-cream 939
Soy products
proteases & thermal behaviour/ solubility/ structural properties of soy conc. 878
twin-screw extrusion & nutrient-based soy products 865
Spectroscopy
dough mixing, monitoring NIR spectroscopy of 922
Spray drying
faba bean protein flour, spray/ freeze drying & functional properties of 873
Spraying
beef, decontamination sequential spraying treatments of inoculated 953
Stability
egg yolk, α-tocopherol content & oxidative stability of 970
goat meat, EDTA/ ascorbic acid dip treatment & storage stability of 955
goat milk fat fractions, storage stability of 928
sweeteners, stability/degradation of 840
Starch
amylose/ amylopectin ratio & baking condition on resistant starch formation/ glycaemic indices 842
tube rheometer & flow behaviour of conc. starch dispersions 915
Sterols
fruit juices, sterol analysis in 990
Stickiness
sugar-rich foods, stickiness perception/ measurement in 1000
Storage
bread, storage & textural attributes of Arabic 925
ready-to-use vegetable curry gravy, preparation/ preservation/ storage of 880
seafood products, Listeria monocytogenes & modified atm. stored value-added 971
Storage cereals
rice, quality & storage of long-grain rough 849
Storage cold
scallop, muscle extractive components & changes during refrigerated storage of Japanese baking 980
Storage fruits
acerola Malpighia fruit/ products, processing/ storage of 896
bananas, storage & colour changes in 902
Storage meat
goat meat, EDTA/ ascorbic acid dip treatment & storage stability of 955
Storage milk
goat milk fat fractions, storage stability of 928
Storage modified atmosphere
corn, storage mod. atm. & nutritional loss prevention in 866
Storage vegetables
plantains, storage & colour changes in 902
Sucralose
stability/degradation of sucralose 840
Sugar confectionery
stickiness perception/ measurement in sugar-rich foods 1000
Sugars
foods, sugars detn. HPAEC in 823
Sulphites
mustard pastes, sulphite treatment & allyl isothiocyanate in 877
Sulphur
wheat dough, sulphur/ nitrogen concn. & extensibility of 919
Sunflower oils
sunflower seeds, enzymatic treatment during aqueous oil extraction from 997
Sunflowers
seeds, enzymatic treatment during aqueous oil extraction from sunflower 997
Sweeteners
stability/degradation of sweeteners 840
Tea
Cyclopia maculata, pretreatment & fermentation of honeybush tea 995
plucking standard/ fermentation time & quality changes in black tea 994
Tenderisation
mutton, post-mortem $CaCl_2$ injection & tenderisation of 954
Tenderness
lamb Callipyge longissimus, prerigor freezing/ postrigor $CaCl_2$ injection & tenderness of 947
Texture
bologna-konjac blend, functional/ textural/ microstructural properties of low fat 961
bread, storage & textural attributes of Arabic 925
corn cakes, moisture content & texture of glassy 864
hake fillets, texture/ viscosity of frozen 978
Thermal processing
Bacillus cereus, temp./ pH/ a_w & thermal inactivation of 828
multiple response time-temp. integrators & design/ evaluation of thermal process 810
Thermal properties
fermentation, thermal properties changes in alcoholic 824
meat/ potato substrates, Yersinia enterocolitica/ Listeria monocytogenes thermal resistance in 826
soy products, proteases & thermal behaviour/ solubility/ structural properties of 878
wheat starch, thermal/ crystalline properties of waxy 858
Tocopherol
egg yolk, α-tocopherol content & oxidative stability of 970
Tomato juices
polygalacturonase/ pectinesterase activity & rheology/ composition of tomato juices 894
Tumors
yoghurts, antitumor activity of 945
Tuna
albacore tuna, chilling/ freezing computer simulation of 982
Ultra voilet
pork skin/ muscle, Escherichia coli/ Salmonella senftenberg reduction UV light on 958
Ultrafiltration
apple juices clarification, microfiltration/ ultrafiltration ceramic membranes for 991
Ultrasound
dehydration, ultrasound & mass transport rates during osmotic 901

Vanasapathi
differentiation between fat/ vanasapathi 996
Vegetables
high hydrostatic pressure effects on vegetable structure 883
ready-to-use vegetable curry gravy, preparation/ preservation/ storage of 880
sugar-tolerant yeasts isolated from high-sugar fermented vegetables extracts 881
vitamin C content of fresh/ frozen vegetables 879
Vitamin C
vegetables, vitamin C content of fresh/ frozen 879
Vitamins
beef, vitamin E & quality of 950
chocolate milk, light-oxidised flavour development & vitamin A degradation in 914
Volatile compounds
potatoes, volatiles comparison extraction techniques/ GC odour profiling/ GC-MS in raw/ boiled 889
Washing
shrimps, washing/ chlorine disinfection & quality/ shelf-life of iced cultured 973
Water activity
Bacillus cereus, temp./ pH/ a_w & thermal inactivation of 828
Wheat
arabinoxylan-degrading enzymic extracts, characterisation of endogenous wheat 859
dough, sulphur/ nitrogen concn. & extensibility of wheat 919
durum wheat, quality characteristics of high protein derived 854
isolation of low/ high mole. wt. wheat glutenin subunits 855
porridge, rheological characterisation of wheat 853
starch granule properties/ noodle quality in wheat 856
steamed bread from Colorado grown white wheats 924
var., carboxymethylcellulose & rheological/ gas formation/ gas retention properties of Punjab wheat 863
Wheat flour
breadmaking preformance/ rheological measurements of wheat flour 920
pentosanase inhibitor in wheat flour 861
sensory characterisation of extruded wheat flour 843
storage & quality of wheat flour 844
Wheat starch
thermal/ crystalline properties of waxy wheat starch 858
Whey powders
hydration of whey powders 941
Whey proteins
anhydrous milkfat & porosity of whey protein-based microcapsules 943
Mongolian domestic animals, whey proteins composition from 940
Wines
lactic acid bacteria detection/ identification hybridization method in wines 987
Winged beans
physicochemical characteristics/ nutrient composition of winged beans 875
Wort
sorghum wort, malting temp./ time & enzyme development/ properties of 868
Xylopia aethiopica
cowpea seeds, Xylopia aethiopica & shelf-life of 872
Yeasts
ethanol production, osmotolerant Schizosaccharomyces for 836
vegetable extracts, sugar-tolerant yeasts isolated from high-sugar fermented 881
yoghurt-type products, yeast cultures characterisation & flavouring agents in 834
Yeasts wine
oenological characteristics/ enzymatic activities of wine yeasts 835
Yersinia enterocolitica
meat/ potato substrates, Yersinia enterocolitica/ Listeria monocytogenes thermal resistance in 826
Yoghurts
antitumor activity of yoghurts 945
rheological properties of conc. yoghurts 944

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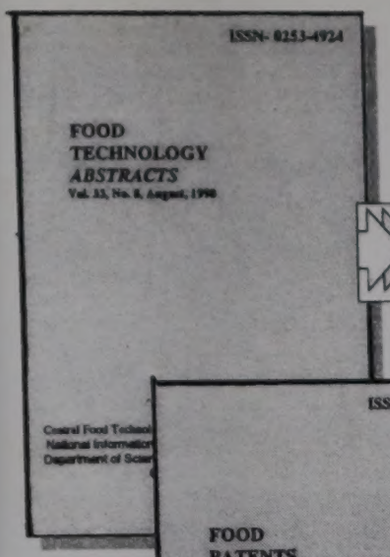

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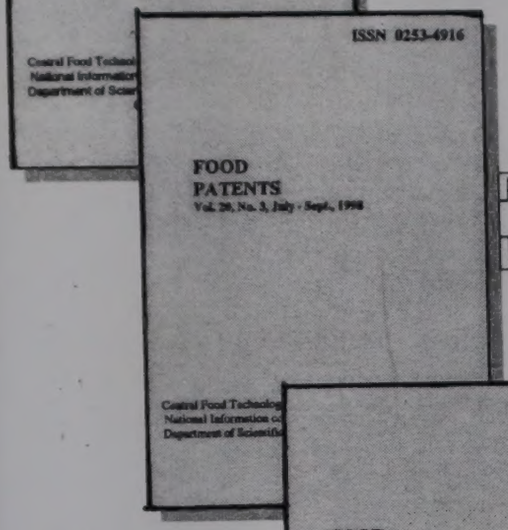

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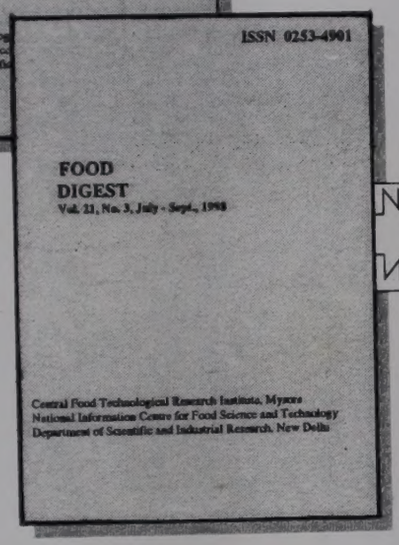
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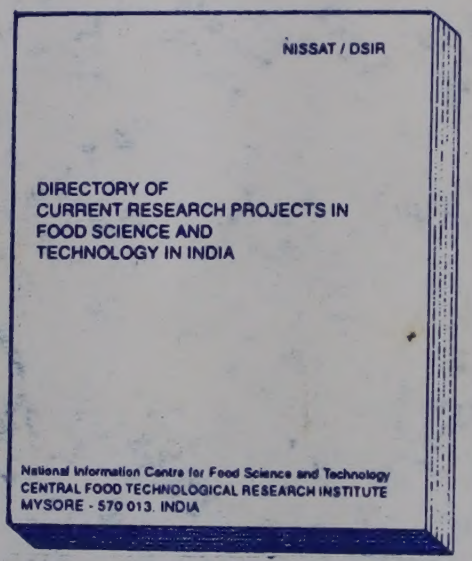
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